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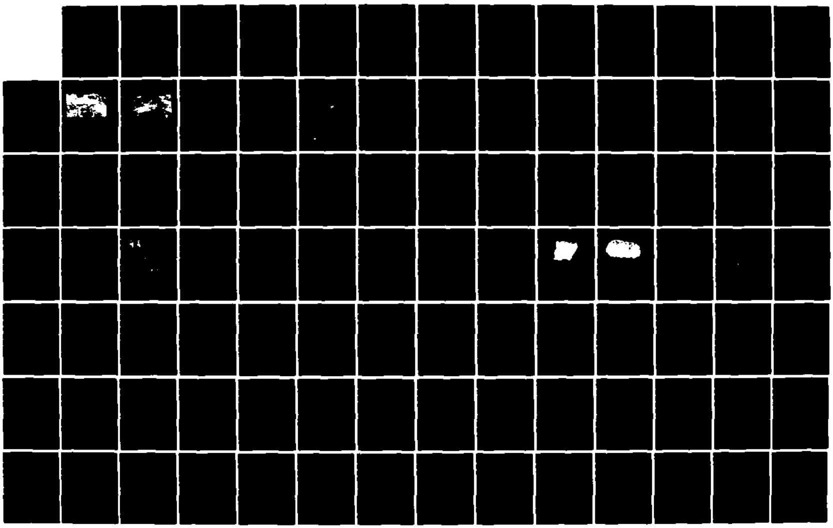

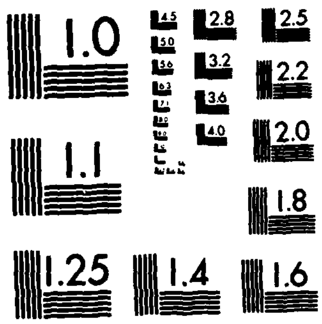

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THE CHAFFEY HILLSIDE SITE, CA-SBr-895;

Report of the Cultural Resource Mitigation Program

By: Lawrence P. Allen
Project Director

Archaeological Resource Management Corporation
12918 Haster Street
Garden Grove, California 92640

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For: U.S. Army Corps of Engineers
Los Angeles District
Environmental Planning Section
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Los Angeles, California 90012

Contract #DACW09-81-C-0016

JANUARY 1982

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This report is a product of the energies and expertise of many individuals. Mr. Richard Macias and Ms. Patricia Martz administered the project on behalf of the Army Corps and Mr. Macias also provided our liason with the Corps. Ms. Martz supplied the field notes and photographs from the test investigation of the site. The overall project, of which the archaeological investigation of SBr-895 is one part, has been coordinated by Marie Cottrell, President of ARMC. Principal Investigator for the project has been Dr. James N. Hill of UCLA.

Helping us to better understand the cultural context of the site were researchers interested in the area; Dr. Thomas Blackburn of Cal Poly Pomona, Dr. Bernice McAllister of Chaffey College and Dr. Fred Reinman of Cal State Los Angeles. Mrs. Grayce Teal of the San Bernardino County Museum graciously provided the records of sites in the vicinity of SBr-895. Mr. N. Nelson Leonard III of the San Bernardino County Planning Department provided background information on earlier investigations of the site.

Mr. W. Waugh and Mr. K.E. Gwin of the Department of Water and Power, City of Los Angeles and Mr. J. Kline and Mr. P. Herrera of the Cucamonga County Water District provided helpful information on the extent and locations of modern disturbance to the site.

Our field crew members included Katie Del Chario, Debra Digua, Karen Jasper, Larry Sullivan, Terry Quenette, and John Milburn. John Milburn also served as stratigrapher for the project and is responsible for the wall profiles and strata descriptions found in Appendix E. Debra Digua was responsible for the cataloging, material identification, and preliminary classification of the artifacts recovered in addition to contributing the paper on the geologic history of the region as it applies to the lithics of SBr-895, included here as Appendix D. She would like to acknowledge the guidance of Mr. Ronald Gibson, Dr. Hugh Wagner, and Dr. Steven Williams with the lithic material identifications and the editorial advice of Dr. Wagner. Dr. Wagner also identified the faunal remains discussed in Section 8.0.

Adella Schroth, in her capacity as laboratory director of ARMC, was responsible for the processing of samples for specialized analyses. Glenn Russell of the Obsidian Hydration Laboratory of UCLA, provided the hydration measurements. Esta Wing drew the obsidian items depicted in Figure 1, while James Bennett illustrated the spherical ground stone piece of Figure 2 and provided the base map used for Maps 2 through 5. Janet Hammond typed the manuscript.

Special thanks are due several individuals. Marie Cottrell contributed to the sections dealing with food resources and tool functions. Dr. Hill, along with Mr. Macias and Helen Wells of the Corps provided thorough reviews of the draft of this report, their suggestions have eliminated many instances of convoluted logic and grammar. Those that remain are my responsibility alone.

L.P.A.

ABSTRACT

This report focuses on the archaeological segment of a three-part project undertaken by Archaeological Resource Management Corporation in fulfillment of Contract DACW09-81-C-0016 issued by the United States Army Corps of Engineers. ~~This~~ the archaeological portion had as its subject the Chaffey Hillside Site, CA-SBr-895, at the base of the San Gabriel Mountains overlooking the Cucamonga area of the Pomona Valley.

The research included a review of relevant site survey and site report records and consultation with archaeologists interested in the Cucamonga area, in addition to fieldwork at the site itself involving a program of controlled surface collection and excavation.

The site represents a small cyclically re-occupied camp at least 1300 years old. Activities at the camp appear to have focused on the extraction and processing of plant materials, specifically yucca and oak. It is hypothesized that the people responsible for creating the deposit were based for the greater portion of the year at a larger settlement near Red Hill, and visited SBr-895 while following a seasonal round of movement targeted at particularly abundant wild resources.

Included in the report are sections dealing with the natural and cultural contexts of the site, field procedures used, radiocarbon dates and obsidian hydration measurements obtained, and probable lithic source areas along with detailed accounts of the artifacts, debitage, and faunal remains recovered. Also included is a discussion of the problems in the application of existing cultural historical frameworks to sites in the interior portions of the greater Los Angeles Basin, and some predictions of what

might be expected at other sites in the region if the reconstruction offered for the settlement system of which SBr-895 was a part is correct.

Included among the appendicies are discussions of the geologic history of the region as it applies to lithic resources of interest to the site's inhabitants and the soil stratification encountered.

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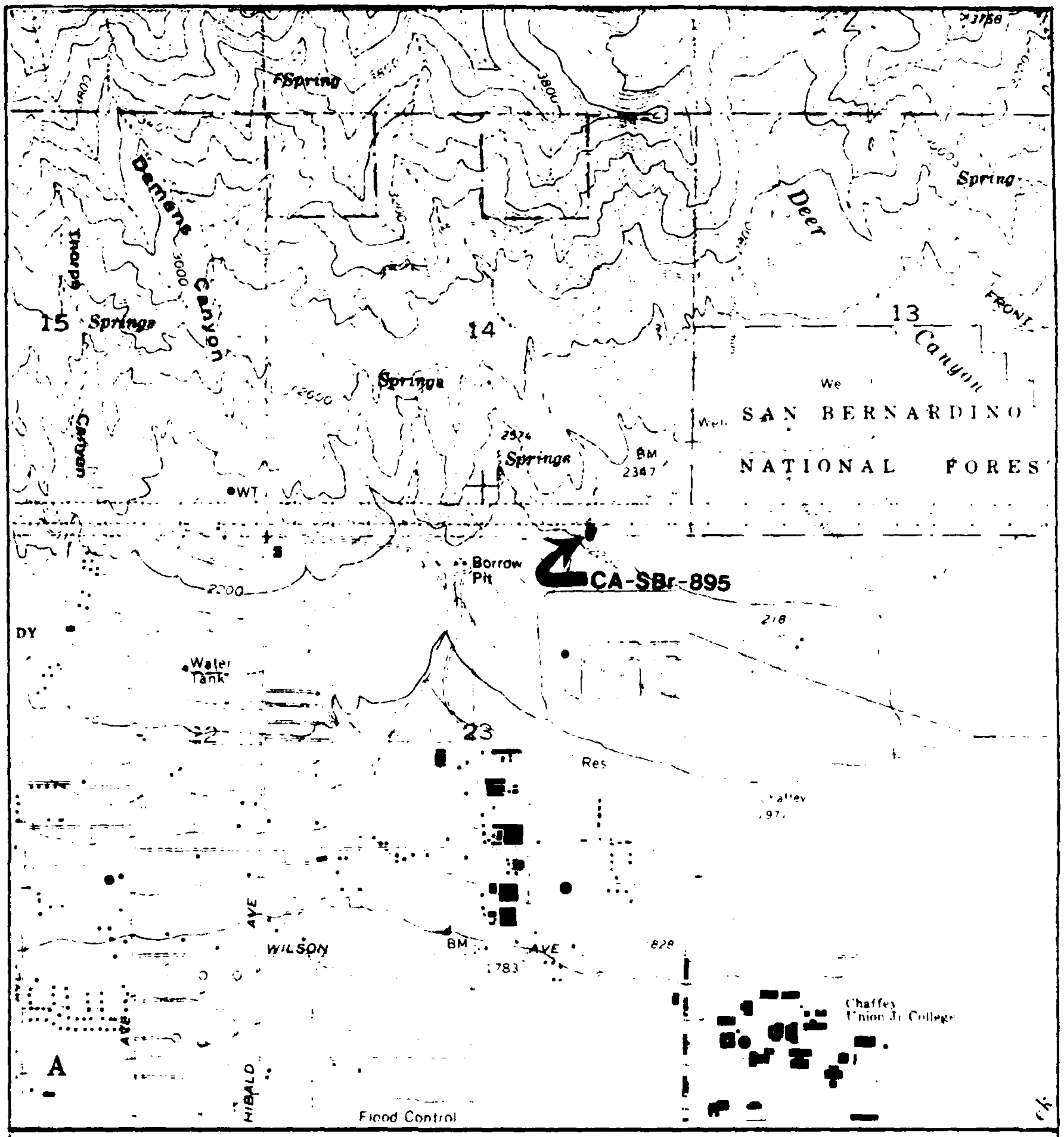
1.0 INTRODUCTION

1.1 Background to the Investigation

The following report presents the findings of an archaeological salvage investigation conducted at the prehistoric Chaffey Hillside Site, CA-SBr-895. The purpose of the mitigation program was to alleviate any adverse impacts which may occur to the site as a result of the construction of a flood control related hillside debris basin. This archaeological investigation was one aspect of a three-part interdisciplinary mitigation program which also included an extensive archival study of the early census records housed at the San Gabriel Mission and a related interpretive display exhibit which is being prepared for the San Manuel Reservation Cultural Center. The entire project was undertaken by Archaeological Resource Management Corporation (ARMC) in fulfillment of Contract #DACW09-81-C-0016 as amended November 14, 1980 and issued by the Environmental Planning Section of the Los Angeles District, United States Army Corps of Engineers. Marie Cottrell, President of ARMC, served as coordinator for the project, and Dr. James N. Hill as Principal Investigator. The project was coordinated with Patricia Martz and Richard Macias of the Army Corps of Engineers.

1.2 Location of the Site

The site is situated at the base of the foothills of the San Gabriel Mountains overlooking the Cucamonga area of the vast Pomona - San Bernardino - Riverside Valley, an inland, intermontane segment of the Los Angeles Basin, to the south (Map 1). From the northern edge of the valley floor at about 2200' (670.6 m), the mountains rise rapidly to an elevation of 8859' (2700.2 m), at Cucamonga Peak, 6.4 kilometers north of the site.



MAP 1: Site Location

Source: U.S.G.S. Cucamonga Peak
7.5' Quad 1966
(Photorevised 1973)

0 1000 2000 3000 4000 feet

0 .5 1 kilometers

N

The channel of a small spring-fed stream forms the western boundary of the site, while the broad alluvial fan of Deer Creek opens to the east. The site backs up against the steep (45° slope) hillside to the north, and scattered artifacts were found down the more gentle 12° grade to the south and southwest (Plates 1, 2; Map 2).

More specifically, the site is located at 37° 9' 55" North Latitude and 117° 34' 43" West Longitude in the Southeast ¼ of Section 14; Township 1 North, Range 7 West on the U.S.G.S. Cucamonga Peak 7.5' Quadrangle (1966, photorevised 1980). The Universal Transverse Mercator designation is Zone 11, 446630E, 3780480N. The cultural deposit itself spanned the 2245' (684.3 m) to 2225' (678.2 m) contours and scattered artifacts continued down the slope to the 2205' (672.1 m) elevation.

1.3 Previous Investigations

The site was discovered by students of nearby Chaffey College and officially recorded in August of 1975 by N. Nelson Leonard, then with the Archaeological Research Unit at the University of California, Riverside (UCRARU). The San Bernardino County Museum designation for the site is #2707.

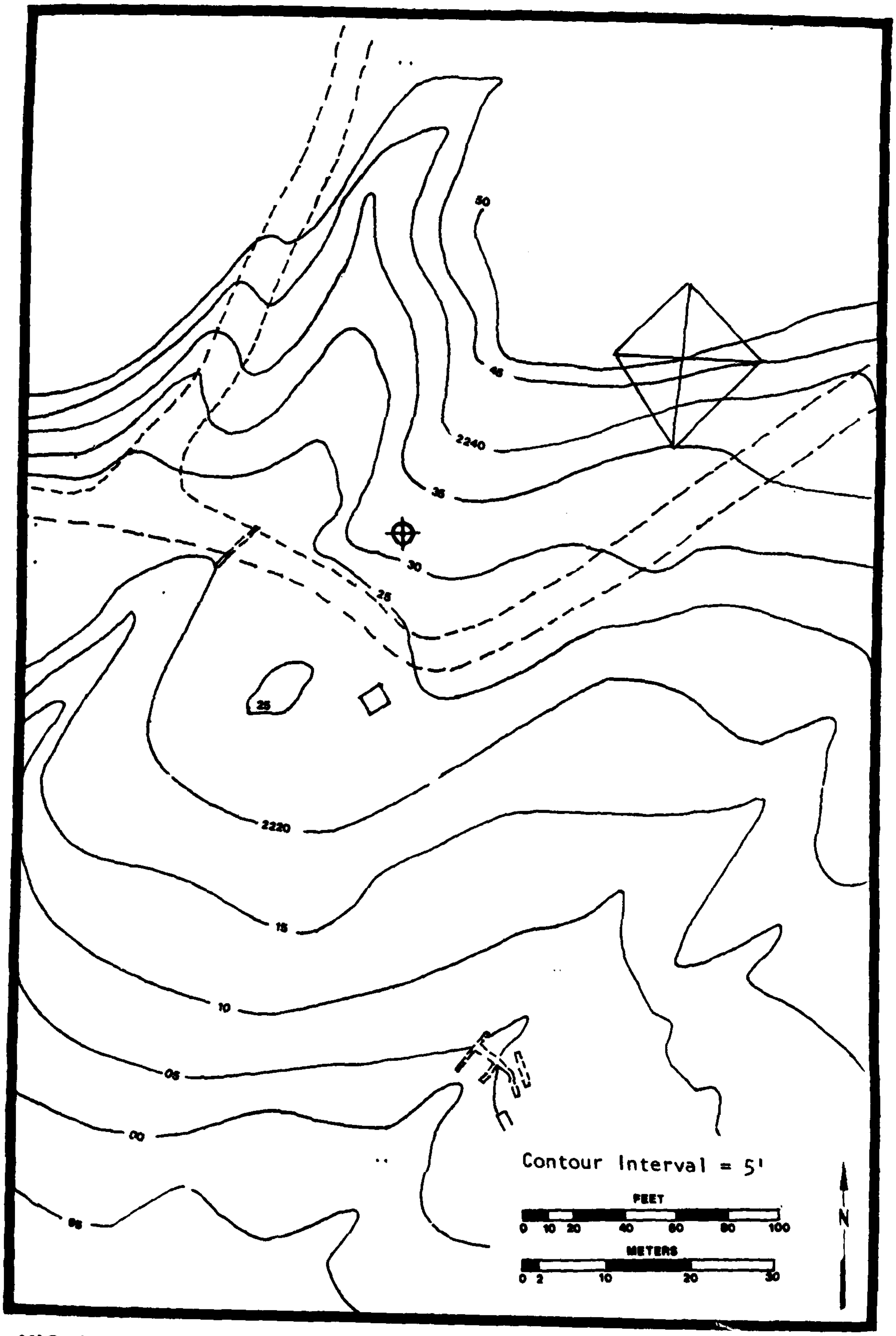
A surface inspection and a series of test excavations were carried out at the site in conjunction with a program of survey and testing of sites in the Cucamonga, Demens, Deer, and Hillside Creek Channels conducted for the Army Corps of Engineers. These investigations were conducted by the UCRARU, under the direction of Patricia Martz (1976). The results of this investigation were presented in a report (Martz 1976), which also set forth a series of mitigation recommendations that structured the format of the present project.

Excavations in Progress at Unit #8 (left middle ground) and Unit #7 (center middle ground). Note position of transit over datum between units.

Plate 1: View Facing North Across Site.

Units #5, 6, 7, 9 open (left foreground) and #8 (right background).

Plate 2: View Facing South From Half Way Up Hill.



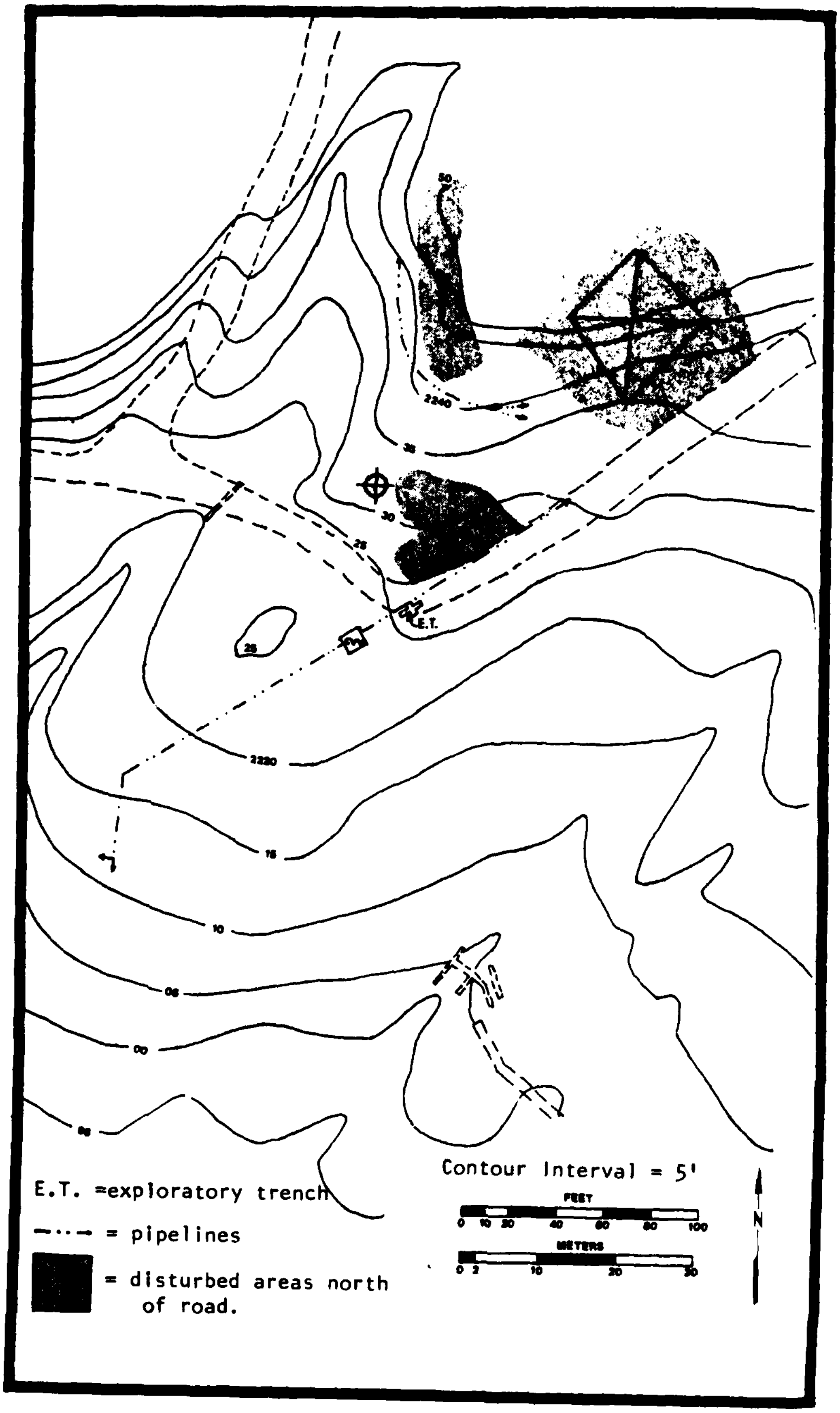
MAP 2: Area of Investigation

1.4 Present Condition of the Deposit

Map 3 illustrates some of the modern disturbances which have affected the deposit. An unpaved power line maintenance road crosses the area and bisects the site. The area to the south of the road has been scraped clean, and the only remnant of the original ground surface is a small rise that can be seen as the 2225' contour on Map 3. Additionally, a Cucamonga County Water District pipeline trench runs down from the northeast and into the control valve vault before exiting to the southwest and then turning south.

The north side of the road cuts to a depth of 150 cm into the hillside near the datum point. To the east, the hillside and road more gradually merge in the vicinity of Transmission Tower #22111. The west side of the hill itself has been cut by mechanical equipment, and an area has been gouged immediately east of the datum; both a 22 cm diameter concrete pipe and a 7 cm iron pipe cross the site here. According to Mr. M. Waugh of the Department of Water and Power of the City of Los Angeles, a copper grounding cable, attached to the south leg of the transmission tower, was laid across the area in the 1930's.

The surface of the site has served as a recent dispersed dump, with broken bottles being the most common objects seen. The spot has evidently retained its attraction as a focus of campsite activities. Modern materials penetrated to a maximum depth of 30 cm below surface in the units excavated.



MAP 3: Disturbances.

2.0 PHYSICAL AND CULTURAL CONTEXTS

2.1 Natural History

The northern edge of the Pomona Valley intersects the southern face of the San Gabriel Mountains at approximately the 2200' (671 m) elevation contour near which the site lies. This is also roughly the boundary between the warm-semiarid climate of the valley and the warm-subhumid climate of the foothills (Bailey 1954). Rainfall along the northern edge of the valley averages 20-24" (51-61 cm) per year (Storey 1948:Figure 4).

The site sits between the Recent alluvium of the Deer Canyon Wash to the west and older remnant Pleistocene deposits that cover the higher elevations in the valley to the west and southwest (Appendix D:Map 6). Immediately north of the site, the San Gabriel Mountains begin with some of the oldest rocks in the region, the Precambrian igneous and metamorphic complex (Rogers 1967). These rise on the northern side of the Cucamonga Fault, a northward dipping thrust fault. At successively higher elevations are exposed first the Pre-Cretaceous metamorphic rocks and then the Mesozoic granitic batholith. A more detailed account of the geologic history of the region, particularly as it applies to lithic resources important to the native inhabitants and found at SBr-895, is given in Appendix D.

Spring-fed streams run along the canyon bottoms near the site. Rainfall is particularly heavy in the shadow (southeast) of San Antonio Peak located in the mountains north of the site in an area that forms the watershed for these streams (Storey 1948:11).

The amount of water in any particular stream is in part a function of the permeability of the underlying rocks. The streams, that drain the mountain front in the area of the site and generally from the region north of Ontario to Lytle Creek, are underlain by areas of massive diorite that is not fractured to any great depth (ibid:14). Here stream flow continues through the summer. This is in contrast to the San Dimas Canyon area, feeding into the San Gabriel Valley to the west. Here the Pre-Cretaceous rocks are fractured to greater depths and a great deal of water can seep through and down into the valley fill without ever appearing on the surface.. In years of normal precipitation, stream flow usually stops by the middle or end of July (ibid).

Springs also fed the marsh that covered a portion of the plain at the base of Red Hill before it was drained for 19th century agriculture. In addition to providing plant materials, the marsh would have served as the home of the densest populations of year-round resident birds and fall/winter resident migrants.

The site itself is located at the juncture of the Coastal Sage-scrub (soft chaparral) and (hard) Chaparral Plant Communities. Scattered Woodland associations occur along nearby moist canyon bottoms. In its lower reaches, chamise-dominant Chaparral merges indistinctly into the Coastal Sage (Bailey 1954:37). The Coastal Sage-scrub of the edges of the plain south of the site presents a low-to-medium density cover of low shrubs. Common plants of this community include California sagebrush (<u>Artemisia californica</u>), white sage (<u>Salvia apiana</u>), black sage (<u>Salvia mellifera</u>), yerba santa (<u>Eriodictyon crassifolium</u>), California buckwheat (<u>Eriogonum fasciculatum</u>), and lemonadeberry (<u>Rhus integrifolia</u>). Common mammals include the California ground squirrel (<u>Spermophilus beecheyi</u>), nimble kangaroo rat (<u>Dipodomys agilis</u>), desert wood rat (<u>Neotoma lepida</u>), California mouse (Peromyscus californicus), and the short-eared pocket mouse (Perognathus fallax). Associated reptiles include the western fence lizard (Sceloporus occidentalis), striped racer (Masticophis lateralis), and western rattlesnake (Crotalus viridis), (Jaeger and Smith 1966:44).

The chaparral of the mountains north of the site presents a denser, almost impenetrable cover. Characteristic plants of the Chaparral Community include chamise (Adenostoma fasciculatum), California holly or toyon (Heteromeles arbutifolia), holly-leaf cherry (Prunus ilicifolia), California lilac (Ceanothus sp.), Spanish bayonet (Yucca whipplei), laurel sumac (Rhus laurina), and sugar bush (Rhus ovata) (Ornduff 1974:92-93). Associated mammals include the mule deer (Odocoileus hemionus), coyote (Canis latrans), gray fox (Urocyon cinereoargenteus), bobcat (Lynx rufus), and brush rabbit (Sylvilagus bachmani). Reptiles include the southern alligator lizard (Gerrhonotus multicarinatus) and coast horn lizard (Phrynosoma coronatum) in addition to the species also found in the Sage-scrub zone (Jaeger and Smith 1966:44-45).

Canyon-bottom woodland trees identified near the site include coast live oak (Quercus agrifolia), golden willow (Salix lasiandra), arroyo willow (Salix lasiolepis), and big-leaf maple (Acer macrophyllum).

2.2 Cultural Setting

Cultural change in the southern California coastal region was very slow when compared to the cultural changes which occurred elsewhere in North America. This has lead to numerous problems in culture historical reconstruction in the local area. Unlike other regions where cultures have undergone fairly distinct changes through time which can be readily documented through the archaeological record, the cultures represented along the southern California coast have undergone more subtle changes which are more difficult to define and even more difficult to explain. The end product of this situation has been the development of some rather broad, general frameworks which serve as the basis for the culture chronologies in the area.

While there have been two regional chronologies presented for the southern California coastal region, the classic statement of culture chronology was presented by William Wallace in 1955. This chronological framework was phrased in terms of four successive "Horizons"; however, this is potentially misleading, since in more common usage of the term (e.g., Willey and Phillips 1958), horizons are marked by the appearance of a combination of distinctive characteristics that spread rapidly through a culture area and persist only over relatively brief spans of time. The term is inappropriately applied to the patterns of continuity and gradual ill-defined change that describe the prehistory of the southern California coastal region. While Wallace's scheme can be considered to be somewhat inappropriate for the inland valley region, it is the more frequently cited chronology in the literature, and it, therefore, bears reiteration.

Wallace's four-fold scheme begins with Horizon I: Early Man, best known from the San Dieguito complex of the south and desert regions. This complex has not been identified in the Los Angeles Basin area and, therefore, will not be discussed in this text.

The first period which is relevant to the interior of the Los Angeles Basin is Wallace's "Horizon II: Milling Stone Assemblages". These are characterized by large proportions of manos and metates evidently not used in the earlier period. The remaining features are largely negative. That is, the assemblages lack bone or shell tools and ornaments, lack evidence of vessels for storing or cooking food, and contain few well-made projectile points and only scant dietary bone remains. The picture is one of thorough dependence on wild plant resources except along the coast where shellfish remains may be included.

The succeeding "Horizon III: Intermediate Cultures Assemblages" fills an amorphous span between the Milling Stone and Late periods. Common features include greater evidence of hunting and the introduction of the mortar and pestle tool complex. This last is usually linked to the crushing of acorns prior to leaching the tannic acid out of the nut so that the meal could be consumed. Chipped stone tools are more common and more diverse, and include large stemmed projectile points. Bone, antler, and shell tools and ornaments are present, but the use of asphaltum and steatite is rare. Land mammal bones are common as are sea mammal and shellfish remains near the coast. Manos and metates continue to form an important part of the assemblage, but are no longer the predominant artifact type.

The earliest assemblages attributed to the "Horizon III: Intermediate Cultures" are best known from the Santa Barbara region which Rogers (1929) referred to as the "Hunting Culture". This horizon has been dated to approximately 3000 B.C. in its northern extent, but only to approximately 1500 B.C. further south along the southern Los Angeles and Orange Counties coast. The initial appearance is less certain in the interior of the Los Angeles Basin, and is not documented at all in San Diego County.

The final "Horizon IV: Late Prehistoric Cultures" was a period of localization and specialization in adaptations. Local complexes do share certain characteristics which include an abundance of small, finely-chipped projectile points, and sometimes pottery vessels (in the South), circular shell fishhooks, perforated stones, a variety of bone tools, and stone, shell and bone ornaments along with the common use of asphaltum as an adhesive. The importance of hunting and fishing increased although wild plant exploitation continued.

In the Los Angeles Basin, this period is often linked with a hypothesized intrusion of Shoshonean - speaking groups into the coastal region, placed by Kroeber at between 1000 and 1500 years ago (1925:578-579).

In 1968, Claude Warren reappraised the region's chronology from a perspective of cultural ecology. He asserted that interassemblage variation is not only a function of time, but also a product of ecological adaptation in the sense that groups that live by hunting and gathering wild food resources most often move through a yearly seasonal round following the resources targeted as they become available. Contemporary settlements of the same people should contain assemblages reflecting these changing adaptations through the year.

An explanatory framework for adaptive changes was offered by Kowta (1969), with the ultimate motive force seen in climate change. He presented a set of interrelated hypotheses designed to explain the function of scraper planes, the contents of Milling Stone assemblages, and their appearance and localized replacement. Kowta proposed that a tool complex involving scraper planes, hammerstones, manos, and metates, was linked to the processing of fleshy fibrous plants, particularly yucca and agave, for food and cordage. The appearance of these assemblages in coastal southern California is said to coincide with the onset of Antevs' (1952) Altithermal climate phase at around 6000 B.C. As people of the interior were driven to the coast by the increasing aridity and dessication of interior water sources, the climate change also encouraged the spread of agave into the coastal areas which had previously been too moist to support the species. The agave were gradually replaced by yucca, but the tool kit remained. These assemblages persisted with little alteration except in areas where shellfish or acorns were available.

What is needed for a convincing account of either the cultural ecology or explanation of culture change in coastal southern California is a perspective that deals with the evolution of entire settlement systems rather than idealized site types considered as normative representatives of each time period. Sites formed at very different times may share identical assemblages as a function of continuity of seasonal subsistence orientations, just as contemporaneous sites of different positions in the same settlement system may well have very different assemblages. Moreover, a dynamic description of the evolution of settlement systems should be accompanied by an inventory of assemblage characteristics and environmental correlates expectable for sites of each type through time. One of the most critical tasks facing us is to begin to outline this dynamic structure by producing models that are testable by their deducible consequences in the archaeological record.

Returning to the cultural historical sequence, intense contact with Europeans began in the area with the establishment of the Mission San Gabriel in 1771. The San Gabriel Mission was in possession of much of the coastal plain from Aliso Creek in Orange County, north to somewhere between Topanga and Malibu (Johnston 1962). All of the native inhabitants within the domain of the Mission became known as the Gabrielinos. Ethnohistorical records (Reid 1926; Johnston 1962) describe the Gabrielino villages or "rancherias" as being often located on high ground in broad valleys near dependable sources of water. These were supplemented by more temporary campsites established near specific seasonally abundant resources. Populations at the "rancherias" or villages ranged from 50 to 200 people.

One aspect of the present project, of which the archaeological research at SBr-895 is but one part, involves an archival study of the early records of the Mission San Gabriel with particular note made of the records of people associated with the village of Cucamonga located on the rise on the valley floor now known as Red Hill, 5 km southwest of SBr-895. This area was once ringed with prehistoric deposits, now virtually all destroyed. These are more thoroughly discussed in Sections 9.1 and 9.4. The greater inland Valley remained loosely controlled and used as pasture by the Mission until the establishment of the San Bernardino Assistencia in its San Bernardino segment in 1819. Raids on the cattle and horses of the settlers by the nearby Serrano continued well into the 19th century.

3.0 RESEARCH DESIGN AND IMPLEMENTATION

Little is currently known of the prehistory of the interior valley. The nearest fully reported sites lie in the Cajon Pass (Kowta 1969), 18 km to the northeast of SBr-895 and in the San Gabriel Valley (Eberhart 1962; Eberhart and Wasson 1975; Wasson et al. 1978). While radiocarbon dates are not available for any of these sites, they have been assigned to the "Milling Stone Horizon" (Wallace 1955) by their investigators, based on typological considerations. The culture historical framework for the region under consideration is, therefore, replete with gaps both in time and space, and it is difficult to measure the occupation of SBr-895 against the tenuous outline. Establishing the age of the deposit, in addition to describing its assemblage, therefore, is very important if these gaps are ever to be filled in.

Both absolute and relative dating methods have been applied to the evidence of SBr-895. The former includes both radiocarbon age determination of suitable samples and obsidian hydration measurement of all pieces of obsidian recovered. The measurements were made by the UCLA Obsidian Hydration Laboratory before samples were sent to Dr. Roman Schmitt of the Department of Chemistry, Oregon State University for neutron activation trace-element characterization.

Relative dating via the stylistic analysis of temporally sensitive items is based on the premise that societies develop elements of style in their material culture that can be considered independent of function. These styles tend to occur within restricted periods of time and are usually shared among related cultures. The analysis of these stylistically diagnostic artifacts can be used for cross-comparisons between the site and other sites which have been previously dated where similar artifacts have been found. This site, therefore, can be dated relative to other sites in the region.

The problem with using relative dating in the southern California region stems from the persistence of particular types with little or no stylistic changes for hundreds and sometimes thousands of years. Artifacts in the area which have been considered to be temporally sensitive include projectile points, beads, pendants, effigies, cogstones, discoidals and pottery (Warren 1968).

While the site under investigation has been described as a seasonally occupied campsite, it was hoped that the types of data needed to use both methods of dating would be recovered. By using the two dating techniques, it was hoped that a more accurate projection of the duration of the occupation could be derived than relying on either method alone.

The Gabrielino settlement system at the time of missionization most closely corresponded to a semisedentary central-base pattern with secondary camps set up near seasonally available resources. The antiquity of this arrangement is unknown, but it is a question to which our researches could contribute. Martz (1976:25) characterized SBr-895 as a small hunting and gathering camp such as those described for the ethnohistorically known Gabrielino. One of our major tasks was to fill in the details of this picture with a wider view of the subsistence strategies employed at the site.

If SBr-895 was, in fact, a temporary camp which was established near seasonally available resources, the first thing to be considered would be to determine what resources were available near the site which could have had food value to the inhabitants of the region. Based on the flora and fauna inventories presented in the Natural History section of this report, there are five floral and three faunal genera available in the immediate vicinity of the site which are known ethnographically to have been important in the historic diet (Table 1).

Specific to the site area, the presence of a spring and the occurrence of yucca in abundance would have been attractive features for its settlement. Desired fauna such as jackrabbits, brush rabbits and deer could have supplied needed protein to the diet, and would have been available whenever the site was occupied. Other plant resources may have been gathered as well, but their distribution in the Valley would have been widespread, and this locality may not have been occupied specifically for their collection. Yucca could have been collected and processed during the spring and summer seasons, and it is interesting to note that most of the other plants would have been available for part of the same season or seasons. Thus, while yucca may have been the primary focus of collection for part of the spring and summer season, seeds from the sages and buckwheat would also have been available for collection at the same time. During the spring, the yucca blossoms were probably collected, and fresh shoots from the buckwheat and berries from the toyon bush could have been gathered. The only two resources available during other times of the year, mainly the fall and winter, would be the acorn and toyon berries. Thus, the site could have been re-occupied a number of times during an annual cycle.

The tool assemblage recovered from the site should reflect the types of subsistence activities which were being carried out, and should aid in defining which of the available resources were, in fact, being procured and processed. Specifically, tools associated with yucca processing (such as choppers and scraper planes) were expected; projectile points, knives and scrapers

TABLE 1: Uses and Seasonality of the Ethnographically Used Food Resources

PLANTS:

SCIENTIFIC NAME	COMMON NAME	USES	SEASON*
Eriogonum fasciculatum	Buckwheat	shoots, seeds(flour) food, leaves, flowers and medicines	Sp, Su,F
Heteromeles arbutifolia	Toyon	berries-food	F,W,Sp
Quercus agrifolia	Oak	acorn-flour(food)	F,W
Salvia apiana	White sage	seeds-flour,leaves, shampoo,dye,medicine	Su,F
Salvia mellifera	Black sage	seeds-flour, food condiments	Su,F, Sp

ANIMALS:

Odocoileus hemionus	Mule deer	food, tools, clothing	All year
Lepus californicus	Jackrabbit	food, clothing	All year
Sylvilagus bachmani	Brush rabbit	food, clothing	All year

*Sp = Spring; F = Fall; W = Winter; Sm = Summer.

should be evident if game was being captured and processed; and groundstone implements should be evident if the seeds from Salvia and Eriogonum were being collected and processed.

Following the contract specifications, the data recovery program was designed with two aspects, including both an intensive surface collection and controlled excavation of between 25 and 30 cubic meters of soil. Provenience control for surface items was by their exact positions, while excavated items not recovered in situ were located by reference to particular 10 cm excavation levels.

Consideration of the topographic position of the site, at the base of a steep slope, introducted the possibility that it might exhibit physically detectable strata. Such a situation would allow us to trace any changes that might have occurred over the span of the site's occupation. In the analyses that follow, the stratification of the deposit is exploited by assigning each 10 cm excavation level to the natural stratum to which it most closely corresponds. This was done with the aid of detailed profiles drawn of at least two walls of every excavation unit.

The research design called for the placement of the excavation units to be determined by a sampling scheme with a random component. This was to be done in order to be more certain of the validity of extrapolation from the characteristics of the portions of the site sampled to the population of the site as a whole. Upon examination of the site, however, it became clear that the problem was one of finding any patch that had not been previously scraped, gouged, or otherwise disturbed. The units were placed so as to avoid the most obvious and extensive areas of disturbance (See Section 4.0; Map 4). Although the deposit varied in depth and density of cultural materials across lateral space, a good deal of redundancy was found among the units.

It is unlikely that any class of items present in appreciable quantities in the deposit was not encountered in either the surface collection or excavation. The representativeness of our sample, at least in terms of the range of artifact types, does not seem to be a problem.

In addition to temporal and site function dimensions, the question of ethnic identity could well complicate the picture of inter-assemblage variability, since at the time of missionization both Gabrielino and Serrano villages occupied the valley (Kroeber 1925:65; Johnston 1962:14-16). The Serranos ("mountaineers") occupied the eastern San Gabriel Mountains north and east of San Antonio and Cucamonga Peaks, as well as the area across the Cajon Pass and into the San Bernardino Mountains. Serrano villages are also recorded in the eastern San Bernardino portion of the Valley. With control of the Pass, the Serrano also controlled the most likely route for the obsidian and light-colored chalcedony found at SBr-895. Archaeological detectable cultural differentiation might well be found in the products of differential access to these exotic lithic materials. Specifically, Serrano settlements may exhibit higher proportions of obsidian and chert chalcedony in their chipped stone inventories than contemporaneous Gabrielino settlements. Although the comparative perspective necessary to address the question of ethnic differentiation is beyond the scope of this project, an effort has been made to thoroughly document the quantities of exotic lithic materials found at SBr-895 (including volumetric information), in order to facilitate eventual inter-assemblage comparisons.

Samples of the naturally occurring rocks both in and around the site were collected in order to provide a base-line from which to investigate the processes of lithic extraction and curation by identifying those tools made of rocks not found in the immediate area. Our subsequent analytic efforts have been designed to specify the material composition of all artifacts, and the geologic literature has been reviewed in order to isolate likely source areas for each material. A special provision was made for trace element characterization of the obsidian. Although a good many obsidian hydration measurements have been published for sites in coastal southern California, source characterization has rarely been attempted. Yet the source of the samples is a critical issue in the determination of the rate of hydration and, ultimately, the age of the specimens.

Researchers involved in the excavation of sites around Red Hill, the location of the proto-historic Cucamonga Village, 5 km southwest of SBr-895 were contacted. These included Dr. Thomas Blackburn of California State Polytechnic University, Dr. Bernice McAllister of Chaffey College, and Dr. Fred Reinman of California State University, Los Angeles. The site records of the San Bernardino County Museum were inspected, and they revealed several sites recorded for the area after Martz' review (1976).

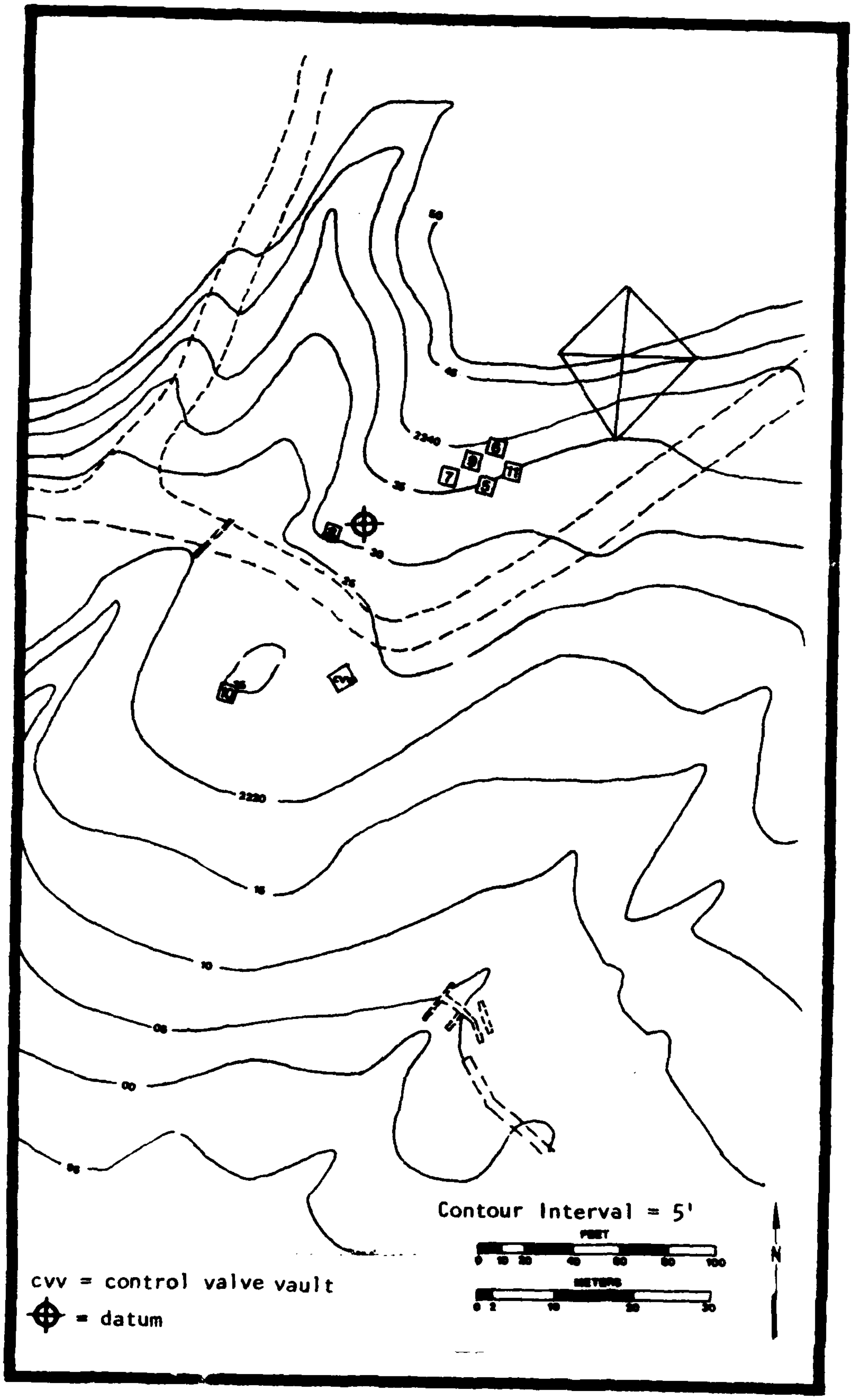
4.0 FIELD PROCEDURES

Our fieldwork took place between January 21, and February 15, 1981, and involved a program of intensive surface collection and controlled excavation. In all, 29.84 cubic meters of soil was excavated, apportioned among seven 2 x 2 m units (Map 4).

Martz' original test investigation datum was first located with the help of field notes she provided. The entire crew then began an intensive surface inspection and collection. The examination extended well beyond the site limits indicated in the test, but in fact no cultural materials were found outside these limits. All suspected items were flagged before being assigned field numbers and collection and their positions were shot in from a transit station established at the test datum. As in the subsequent excavation phase, crew members were urged to be generous in their evaluation of what constituted culturally relevant objects, with the final decisions to be made in the laboratory. This entire procedure was repeated after several days of rain. The results of the surface collection are discussed in Section 7.0.

The transit station itself was tied to several fixed man-made objects in the vicinity (Map 4; Appendix A).

It proved both impractical and unnecessary to establish a formal grid over the site due to the topographic irregularity introduced by modern disturbances acting on the natural slope (Section 1.4). The positions of all surface materials and excavation units are nonetheless specified by reference to their positions relative to the datum.



MAP 4: Positions of Excavation Units.

The original plan to introduce a random element to the placement of the excavation units was abandoned in light of the actual condition of the deposit (Section 4.1). Five of the seven units were placed in what will be referred to as the central area of the site on the broadest, relatively flat, and least disturbed portion at the base of the hillside, north of the power line service road (Map 4). This was virtually the only part of the deposit that appeared reasonably intact, and had not already been sampled by the test level units nearer the stream bank to the west.

All excavation units in the present investigation measured 2 x 2 m and were oriented on magnetic North (14½° East of true North). The numbering system used in Martz' original test was maintained. The 1 x 2 m 1976 test units had been designated #1 through #4, and the present units continued with #5 through #11. The original test units are not shown on Map 4.

Excavation Unit #8 was placed near the datum, between it and the stream bank, in order to allow us to better understand the limits and depth of the deposit. The same was true for Excavation Unit #10, positioned on a small rise that appeared to be the only remnant of the original ground surface south of the power line maintenance road.

The units were excavated and materials collected in 10 cm arbitrary levels following the contour of the ground surface. All soil was dry sifted through rocker screens equipped with ¼" mesh. All lithic artifacts and fragments and suspected debitage not recovered _in situ_ were collected from the screens, as were all animal bones. As in the surface collection, all artifacts recovered in the excavations were stone tools; no worked bone, shell, or ceramics were encountered.

The soil matrix of the deposit included large quantities of unaltered rocks ranging from fist-sized through boulders weighing well over 100 kg; they were predominately angular, reflecting their colluvial origins. These were removed, and excavation proceeded into the sandy yellow subsoil underlying the cultural deposit. The volume that these rocks contributed to the midden appeared to rival that of the soil itself. Subangular and rounded rocks were more common in the two units atop the stream bank (#8 and #10). The largest stream-rounded boulders were also found in these units.

Before the units were backfilled, detailed profiles were drawn of at least two walls and photographs were taken of all walls. Soil samples were collected from selected walls of three excavation units (E.U.'s #6,7,10). Samples of naturally occurring rocks beyond the site's boundaries were collected and a sample was taken of the unaltered rocks found in the levels of Excavation Unit #9.

Assisting our efforts to re-locate the roasting pit reported in earlier investigations, Mr. P. Herrera of the Cucamonga Water District marked the positions of the pipeline leading into and out of the control valve vault (Map 3). A roasting pit-like depression had been noted in the trench built for the pipeline running down from the northeast into the control valve unit. Mr. Herrera informed us that the telephone and electric lines shared the pipeline trench. A small cross-shaped exploratory trench was excavated by hand at the point along the pipeline trench indicated by a test level transit reading for the position of the roasting pit. After a short 150 x 30 cm trench was dug perpendicular to the pipeline in order to locate its southeast wall, a 3 m long trench was extended paralleling the pipeline. The unit was excavated with a pick-axe and shovel with no level control, screening, or collection. Its sole purpose was to expose an expanse of stratification along the pipeline. The top 15 to 40 cm of the south wall of the 3 m segment was composed of a sterile medium brown overburden layer related to the road edge. Below this, a thin (5-10 cm) older humus layer was exposed. Underneath the humus lay a basal orange-yellow gravelly sand. These layers were continuous across this portion of the pipeline, and no soil comparable to the midden north of the road was found. No carbonized material of any kind was seen. In the north wall of the 3 m trench, the green-yellow clean sand used for pipeline trench fill was found under the top overburden layer.

5.0 DATING THE DEPOSIT

5.1 Radiocarbon Dating

Two radiocarbon dates were obtained from samples of charcoal gathered in the excavation units. The samples consisted of scattered flecks of charcoal aggregated from various levels of several units in the central area. This was necessary in order to provide sample weights adequate for the analysis; thus, they do not carry the level of certainty associated with more secure hearth or fire-pit dates. The products of fires of various ages may well have been combined in the samples, and the ages reported may represent some middle interval in a range of younger and older materials.

Table 2 summarizes the radiocarbon data and includes the raw dates, the measured C13/C12 ratios, the dates corrected for isotopic fractionation, and finally, the calendar age of the samples calibrated by the dendrochronologic record using a procedure outlined by Damon et al. (1976).

Sample #1 was made up of charcoal from Strata II and III levels of Excavation Units #6 and #9. Sample #2 contained charcoal from the lowest levels of Stratum 1 in Excavation Units #7 and #9.

The date of less than 180 years B.P. for Sample #2 conforms to the reconstruction of the site's deposition (Appendix E). The colluvium that caps the deposit is a recent phenomenon. The charcoal in this sample most probably was the product of brush fires occurring after the site was abandoned and during the early portion of the period of colluvial build-up.

TABLE 2: Radiocarbon Dates & Corrections Applied

ARMC Sample #:	SBr-895-1	SBr-895-2
Laboratory #:	BETA-2552	BETA-2553
Provenience	E.U.6 70-130 cm E.U.9 60-120 cm (Strata 11 & below)	E.U.7 30-40 cm E.U.9 40-50 cm (Base of Stratum 1)
C-14 Age in Years B.P. ± 1 st. dev.	1450 ± 70 B.P.	less than 180 B.P.
C13/C12	-25.47 0/00	-25.46 0/00
C13 Corrected date	1440 ± 70 B.P.	less than 180 B.P.
Dendrochronologic Calibration	A.D. 530 ± 70	modern

Sample #1 dates some segment of the range of occupation of the site. An effort was made to avoid contamination from Stratum 1 by not including charcoal from the uppermost Stratum II levels in the sample.

5.2 Obsidian Hydration Measurements

All five pieces of obsidian recovered were subjected to hydration measurement. The measurements, reported by Glenn Russell of the Obsidian Hydration Laboratory at UCLA, are listed in Table 3.

Four of the five readings are in such a narrow range (5.4 - 5.8 microns) as to suggest a single or short-term production episode. The outlying value of 7.1 microns comes from the sole projectile point fragment recovered (Figure 1). Aside from the fact that this particular piece was the deepest found, there is no marked correlation between hydration thickness and either the stratum or level depth. The two pieces from Unit 5 were found at least 50 cm apart but differ by only one-tenth of a micron. The two Stratum ' samples come from basal Stratum 1 levels, those most likely to contain an admixture of Stratum 11 materials.

If the single radiocarbon date from the deposit itself is compared to the mean value of these measurements, a linear hydration rate of about 240 years per micron is suggested. This assumes that all pieces came from the same source and that both the obsidian and charcoal are representative samples of the total populations of material deposited. The latter assumption is particularly problematic.

TABLE 3: OBSIDIAN HYDRATION MEASUREMENTS

UCLA OHL#	ARMC ACC#	HYDRATION (Microns)	PROVENIENCE
8050	8634	7.1	E.U.7 100 - 110 cm (STRATUM 111-)
8051	8656	5.6	E.U.8 50 - 60 cm (STRATUM 11)
8052	8662	5.4	E.U.9 40 - 50 cm (STRATUM 1)
8053	8719	5.7	E.U.5 20 - 30 cm (STRATUM 1)
8054	8821	5.8	E.U.5 80 - 90 cm (STRATUM 111-)

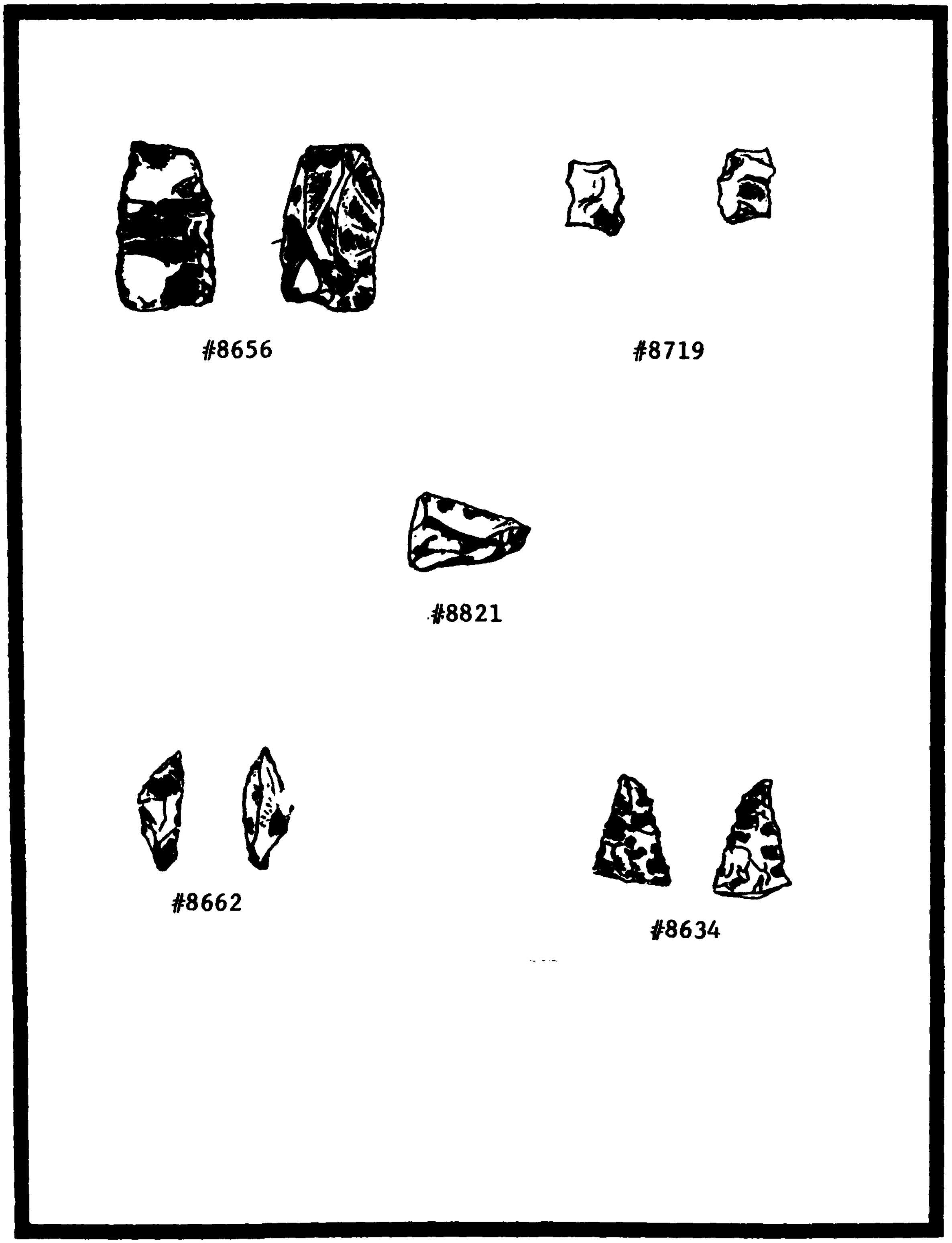


FIGURE 1: Obsidian Tools and Debitage Scale = 1X

6.0 THE ARTIFACT INVENTORY

6.1 Introduction

The bulk of the SBr-895 artifact assemblage is made up of large, simple, percussion flaked scraping and cutting tools, with significant additional numbers of hammerstones and fragmented manos. Other notable items include five whole metates, four mortar or bowl fragments, two fragments of simple pestles, and a single fragment of a small obsidian projectile point. Examples of highly siliceous cryptocrystaline materials (chalcedony, chert, obsidian, quartz), whose characteristic conchoidal fracture patterns make them suitable for delicate pressure flaking, are rare.

All artifacts recovered were of stone. No shell artifacts or worked bone were encountered. Thirty-one of the 199 artifacts were found on the surface, while the remaining 168 came from the excavations. Seven of these artifacts had dual functional for a total of 206 distinct tools. For these, each function is enumerated separately in the artifact listings that follow. In addition to the artifacts, 85 pieces of debitage were recovered.

Non-artifact items listed in the catalog and assigned accession numbers include two small pieces of asphaltum, a piece of obsidian debitage, a small spheroidal scoria pebble designated a manuport, and five rocks possibly used as pigment stones.

Within each description type category, the items are ordered first by the number of the excavation unit in which they were found, and within each excavation unit by the particular 10 cm level in which they were found. The designation "5", for instance, refers to a 40-50 cm level. The designation "0" in the EU (Excavation Unit) column is used for items found on the surface; in these cases, the number in the LVL (level) column gives the surface collection field number assigned to each. The next column reveals whether the item is whole, "W" (at least 95% of the original tool), or fragmentary, "F". This is followed by the weight of whole items in grams and their dimensions in centimenters. The next column provides a mnemonic code for the lithic material. These codes are explained in Table 4. The next column is reserved for any additional comments including alternate functions of multi-purpose tools, additional descriptive information, and for mano fragments, an estimate of the percentage of the original when whole represented by the fragment. The final, rightmost column provides the ARMC accession number assigned to each piece.

The same information included in the listings of this section is provided in different forms in Appendices B and C. In Appendix B, the data are sorted by provenience, all items from a particular level of each unit are grouped together. For Appendix C, they are sorted by the material from which they are made.

For several artifact classes, tables of summary descriptive statistics are interspersed with the listings. These tables include the range of the metric determinations for all whole objects in each class, the mean of the values, the sample standard deviation, and the coefficient of variation (V). This last is simply the standard deviation divided by the mean and represents the relative degree of homogeneity among all items of each class on each measure. A low value of V means that the items of the class are very similar on the measure and, conversely, a high value indicates a more varied range of values on the measure. A value of V of 0.0 would reflect a standard deviation of 0.0, which would be the case if all measurements were identical.

TABLE 4: Lithic Material Codes.

AND	andesite
ANDV	vessicular andesite
ASPH	asphaltum
CAT	cataclastic
CHALC	chalcedony
DRT	diorite
FELS	felsite
GN	gneiss
GNE	epidote gneiss
GNG	garnet gneiss
GRDR	granodiorite
GRNL	granulite
MBST	metabasalt
MTSD	metasedimentary
MTV	metavolcanic
OBS	obsidian
QZM	milky quartz
QZT	quartzite
RHY	rhyolite
SCH	schist
SCO	scoria
SDSTA	arkosic sandstone
SKARN	skarn
VCFG	fine-grained volcanic

Lithic materials are more thoroughly dealt with in Section 6.6. Spatial relations within the deposit and the distribution of items in relation to the soil strata are discussed in Section 7.0. Comparison of the assemblage with those of other relevant sites is the subject of Section 9.3.

6.2 Ground Stone

Fifty-three pieces of ground stone were recovered from SBr-895. Of these, thirty-one were identified as manos, fifteen as metates, four as mortars, two as pestles, and one miscellaneous pigment grinding stone. Manos and metates, along with the hammerstones presumably used for their re-surfacing, comprise the millingstone tool complex, a group of artifacts probably involved in the processing of vegetal and animal foods, pigments, and medicines. Hard seeds, such as those of the local sages and buckwheat, were probably ground into a flour which then could be boiled and eaten. Similarly, small animals could have been processed using the same implements, so that they might be consumed in their entirety. Medicines and pigments, likewise, were probably ground. When the process of leaching became known, the acorn was added to the list of exploitable resources and mortars and pestles became part of the ground stone inventory.

Manos

Of the thirty-one manos recorded only five are complete. The manos are subdivided into unifacial (/U)(n=18) and bifacial (/B) (n=13) categories. The designation "/U?" (n=6) means that the fragment is at least unifacial, but that the piece is too small to determine whether the original was unifacial or bifacial.

Seven manos (all bifacial) are given the addition code "/ES" meaning that their edges have been deliberately shaped by varying degrees of pecking and grinding. An estimate of the percentage of the whole object represented by the fragments is recorded in the COMMENT column.

DESCRIPTION	EU	LVL	W/F	WEIGHT	LENGTH	WIDTH	DEPTH	MATERIAL	COMMENT	ACC#
MANO/B	0	1	F					GRDR	20%	8787
MANO/B	5	5	F					DRT	30%	8740
MANO/B	5	8	F					GRNT?	30%	8762
MANO/B	7	8	F					DRT	20%	8631
MANO/B	8	2	F					DRT	80%	8637
MANO/B	8	4	F					DRT	50%	8644
MANO/B/ES	5	4	F					DRT	30%	8735
MANO/B/ES	5	4	W	681.00	9.85	9.67	4.15	GRDR		8734
MANO/B/ES	5	5	F					DRT	20%,WEDGE-SHAPED	8741
MANO/B/ES	5	6	F					DRT	30%	8746
MANO/B/ES	5	7	F					DRT	20%	8751
MANO/B/ES	5	8	F					GRDR	40%	8760
MANO/B/ES	7	5	F					DRT	30%	8620
MANO/U	0	3	W	879.63	12.50	10.10	4.62	GN		8789
MANO/U	5	4	F					CAT	30%	8724
MANO/U	5	8	F					DRT	20%	8761
MANO/U	6	8	F					GN	60%	8776
MANO/U	6	11	F					CAT	60%	8781
MANO/U	7	6	W	482.38	12.40	8.64	4.30	DRT		8623
MANO/U	8	4	F					DRT	70%	8643
MANO/U	9	8	F					GRDR	30%	8668
MANO/U	9	9	W	1021.50	13.60	9.63	6.12	GNE		8672
MANO/U	11	6	W	964.75	10.48	8.87	6.63	CAT		8698
MANO/U	11	7	F					GRNT	20%	8702
MANO/U	11	8	F					CAT	60%, HAM/COB	8708
MANO/U?	5	4	F					GNG	<10%	8725
MANO/U?	5	9	F					DRT	10%	8768
MANO/U?	8	3	F					GRNT	30%	8640
MANO/U?	8	4	F					ANDV	10%	8646
MANO/U?	9	7	F					DRT	20%	8664
MANO/U?	9	12	F					DRT	10%	8682

MANO (5)	MAX.	MIN.	MEAN	STD DEV	V
WEIGHT	1021.50	482.38	805.85	222.16	0.28
LENGTH	13.60	9.85	11.77	1.55	0.13
WIDTH	10.10	8.64	9.38	0.61	0.07
DEPTH	6.63	4.15	5.16	1.13	0.22

Metates

Five complete metates and ten metate fragments were recovered. Three of the whole examples are flat slabs ground on one surface, but #8818 and #8819 also show evidence of lesser amounts of grinding on their dorsal surfaces. The other two whole metates have oval basin-shaped ground surfaces. Metate #8816 has a roughly V-shaped bottom that would not have balanced unless it was set into the ground. The dorsal surface of #8820 was shaped by pecking. Examples of these complete metates are shown in Plates 3 and 4.

DESCRIPTION	EU	LVL	W/F	WEIGHT	LENGTH	WIDTH	DEPTH	MATERIAL	COMMENT	ACC#
MET	0	10	F					DRT		8795
MET	0	18	F					GN		8804
MET	5	4	F					SCH		8736
MET	5	6	F					GN		8744
MET	5	6	F					CAT		8745
MET	5	7	F					GRNT		8750
MET	6	7	F					GRNL		8774
MET	9	12	F					GNE		8684
MET	10	2	F					DRT		8686
MET	11	6	F					GN		8697
MET/BASIN	6	10	W	26036.2	43.00	33.00	11.00	CAT	BASIN 1.5 CM DEEP, BLACK STAIN	8820
MET/BASIN	11	5	W	25945.0	48.00	27.00	15.00	GNG	BASIN 5 CM DEEP, BLACK STAIN	8816
MET/SLAB	11	8	W	5675.00	27.00	25.00	5.00	DRT	BLACK STAIN	8817
MET/SLAB	11	11	W	44542.8	49.00	45.00	13.00	DRT	BLACK STAIN	8818
MET/SLAB	11	12	W	9534.00	28.00	31.00	6.00	CAT		8819

Mortars

Three of the four mortar fragments recovered are portions of the base or walls, while the fourth is part of the rim. Judging from the differences in raw material composition, the fragments are pieces of four distinct mortars. The outer surface of each has been finished and either polished or pecked to shape.

MORTAR	0	33	F					VCFG	SHAPED BASE	8615
MORTAR	8	4	F					AND	GROUND BASE	8645
MORTAR	9	8	F					GRNT	SHAPED BASE, BURNT	8667
MORTAR/BOWL	5	4	F					SBSTA	RIM	8739

Plate 3: Slab Metate #8817.

Plate 4: Basin Metate #8816

Pestles

The two pestle fragments are portions of only slightly modified elongated cobbles with oval cross-sections and evidence of crushing wear near their fractured working ends.

DESCRIPTION	EU	LVL	W/F	WEIGHT	LENGTH	WIDTH	DEPTH	MATERIAL	COMMENT	ACC#
PESTLE	0	32	F					SDSTA		8614
PESTLE	7	6	F					GNG		8624

Miscellaneous Ground Stone

The metasedimentary "dish" fragment has a concave ground surface with traces of a yellowish powdery substance. It may represent a portion of a pigment grinding stone.

The granite "sphere" has at least five ground facets (Figure 2). Whether these were formed by the deliberate shaping of the object to spherical proportions or in its use as a grinding tool is uncertain.

DISH	0	20	F					MTSD	8806
SPHERE	7	10	W	482.38	7.54	6.97	6.40	GRNT	8633

6.3 Chipped Stone Tools

A total of 129 chipped stone tools were identified. These include 49 cores or large, thick scrapers with steep edge angles, 24 retouched or "sharpened" tools and 56 utilized flakes. The large scrapers and scraper planes generally are assumed to have functioned as woodworking or heavy plant shredding tools (Kowta 1969, Wilmsen 1968). Of the 24 retouched tools, seven were categorized as knives and seventeen as scrapers. In the utilized flake category, ten were categorized as knives and 46 as simple scrapers. Some portion of the 85 pieces of debitage recovered may also have been used as tools without producing any detectable modification to the original edges.

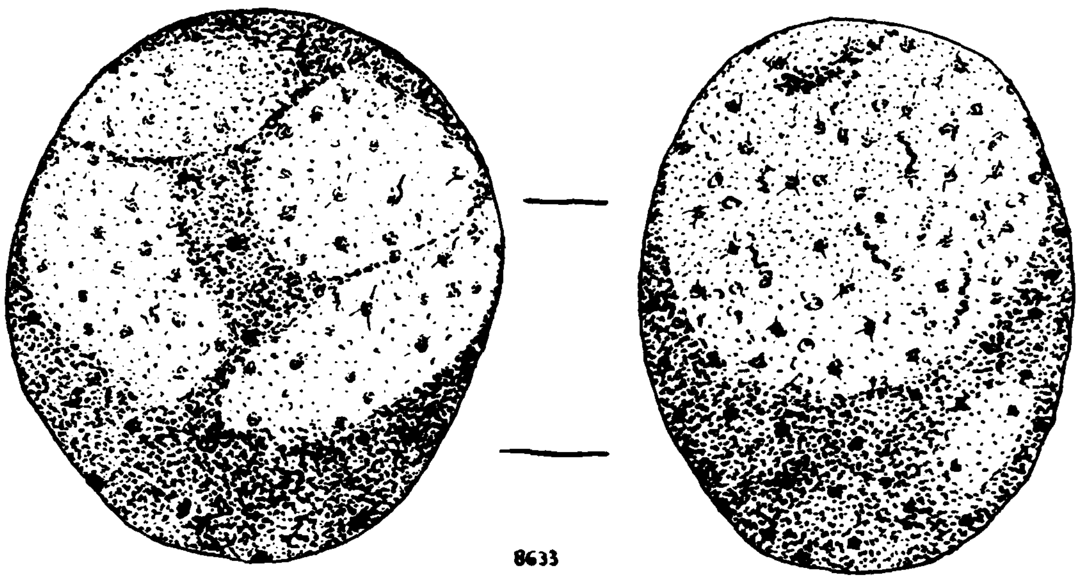


FIGURE 2: Sphere Scale = 1X

Scrapers, as their name implies, are used to scrape objects. For example, they may have been used to remove sinew and connective tissue from hides, as well as to soften them; to perform various woodworking activities and to shred fibers of plants. The resultant wear pattern is observed as the removal of chips from one side of the edge, the edge which has contact with the object being worked.

Knives on the other hand, are used to perform cutting functions, and as such, the wear appears on both sides of the edge. These tools were presumably used to cut meat, hides, bone, and wood.

Scrapers

The core and large, thick flake scrapers are coded SCR/P for scraper planes (plano-convex scrapers), SCR/CE for curved edge scrapers, SCR/SE for straight-edge scrapers, and SCR/CL for the single scraper-cleaver. This generally follows the classification devised by Kowta (1969:20-27) to categorize examples of these tools recovered from the Sayles Site in Cajon Pass. His classification, in turn, is an adaptation of earlier schemes used by Treganza and Malamud (1950:136-139) and Johnson (1966:5-7) for Milling Stone sites of the Topanga Complex of the Santa Monica Mountains. All these sites have much more extensive and diverse artifact inventories than that recovered from SBr-895 and wider ranges of scraper types. For the purpose of the present study Kowta's "Lowback Uniface Scrapers", that differ from his scraper plane category only in their lower profiles, are combined with the latter. This was done because the bulk of the examples from SBr-895 have a height (depth) less than half the maximum basal dimension, and thus would not qualify under Kowta's narrow definition of scraper planes (although they certainly are such by the more common usage of the term, including the usages of Treganza and Malamud and Johnson).

The scraper planes are core or, less commonly, thick flake tools. The flat basal surface may be formed by the cortex, a naturally flat fracture plane, or a single large flake scar. The convex dorsal surface may exhibit varying amount of percussion flaking. A fundamental characteristic is the steep angle of the working edge, generally between 70° and 90°.

SCR/P/2A correspond to the Type 11A scraper planes of Kowta (1969), Treganza and Malamud (1950), and Johnson (1966). These have a curved working edge extending around one-half to three-quarters of the base.

SCR/P/2B, the Type 11B of the earlier authors, have a curved working edge extending around one-half to one-quarter of the base.

SCR/P/2C, Type 11C in the earlier works, have a straight working edge or edges extending only partly around the basal outline.

SCR/P/3, Type 111 at the other sites, have two distinct planar platforms, each with its own working edge or edges. These may be either curved or straight and extend around all or part of the platform outlines.

At least two of the scraper planes doubled as hammer/choppers, and many more have evidence of battering. However, it is not possible to be certain whether this is the result of the object having been used as a hammer, or the product of attempts to remove flakes via percussion.

The functions of the scraper planes and thier implications for the nature of subsistence and settlement are discussed in Section 9.2.

DESCRIPTION	EU	LVL	W/F	WEIGHT	LENGTH	WIDTH	DEPTH	MATERIAL	COMMENT	ACC#
SCR/P/2A	0	21	W	368.50	7.36	7.27	4.94	MBST		8807
SCR/P/2A	0	34	W	340.00	7.28	5.57	4.80	GRNL	HAM/CH	8616
SCR/P/2A	5	7	W	249.42	7.66	6.48	3.29	MTSD		8753
SCR/P/2A	9	7	W	204.14	8.36	6.62	3.12	GRNL		8666
SCR/P/2A	9	8	W	295.99	7.00	6.04	5.63	GRNL	HAM/CH	8669
SCR/P/2A	9	12	W	177.54	6.19	6.30	3.55	GRNL		8683
SCR/P/2A	11	6	W	396.68	9.11	7.87	4.24	GNG		8699
SCR/P/2B	5	7	W	595.30	11.32	8.65	5.28	QZT		8754
SCR/P/2B	6	11	W	233.38	7.54	6.45	3.20	GN		8782
SCR/P/2B	8	5	W	595.30	10.95	8.56	4.82	GRNT		8654
SCR/P/2B	9	7	W	228.83	8.07	6.87	3.13	CAT	BLACK STAIN	8665
SCR/P/2B	9	8	W	221.01	8.12	6.14	3.67	MTSD		8671
SCR/P/2B	9	11	W	147.92	6.32	5.73	3.58	MTSD		8681
SCR/P/2B	11	8	W	198.40	7.51	5.98	5.58	QZT		8711
SCR/P/2B	11	8	W	425.20	10.20	7.16	4.90	GRNL		8710
SCR/P/2B	11	11	W	340.20	9.48	6.99	3.92	GRNL		8715
SCR/P/2C	0	9	W	878.80	8.58	6.64	6.50	GN?		8794
SCR/P/2C	0	24	W	680.40	9.14	6.62	6.68	MTSD		8810
SCR/P/2C	5	8	W	538.60	11.05	9.10	3.64	GRNL		8764
SCR/P/2C	9	9	W	226.75	8.91	5.37	3.55	MTSD		8674
SCR/P/2C	11	1	W	261.15	10.54	5.58	3.94	MTSD		8692
SCR/P/3	0	31	W	1106.63	11.17	10.97	6.59	GRNL		8613
SCR/P/3	5	5	W	293.68	8.59	7.64	4.25	GRNL		8742
SCR/P/3	5	7	W	368.50	8.79	8.58	3.78	GRNL		8752
SCR/P/3	7	6	W	425.20	10.09	8.80	4.28	GRNL	BLACK STAIN	8627
SCR/P/3	9	8	W	266.45	7.93	7.31	4.14	GRNL		8670
SCR/P/3	9	9	W	368.50	7.08	6.49	5.15	GRNL		8675

SCR PL (27)	MAX.	MIN.	MEAN	STD DEV	V
WEIGHT	1106.63	147.92	386.39	223.79	0.58
LENGTH	11.32	6.19	8.68	1.51	0.17
WIDTH	10.97	5.37	7.10	1.31	0.18
DEPTH	6.68	3.12	4.45	1.06	0.24

Curved-edge and straight-edge scrapers are not plano-convex in outline. They are large, thick flakes with a working edge more acute than the scraper planes, and generally between 35° and 55° with varying amounts of unifacial percussion retouch.

The single cleaver scraper (SCR/CL) is a very large piece of diorite with two flat surfaces forming a 45° angle along a long straight edge. It has been unifacially flaked along a portion of this edge and is triangular in cross-section.

DESCRIPTION	EU	LVL	W/F	WEIGHT	LENGTH	WIDTH	DEPTH	MATERIAL	COMMENT	ACC#
SCR/CE	0	17	F					NTSD		8802
SCR/CE	0	26	W	50.05	4.82	4.55	1.98	CRNL		8812
SCR/CE	0	28	W	297.22	8.74	6.90	3.84	CN		8814
SCR/CE	5	9	W	301.56	8.05	8.56	4.42	CRNL		8769
SCR/CE	6	7	W	185.61	8.44	7.79	3.72	CRNL		8775
SCR/CE	7	6	W	296.61	8.70	7.20	5.81	CRNL		8626
SCR/CE	8	4	W	239.68	8.37	6.94	4.71	CRNL		8649
SCR/CE	8	4	F					CRNL		8651
SCR/CE	8	4	W	263.51	8.01	4.96	4.70	CN		8650
SCR/CE	9	2	W	197.26	7.93	4.62	4.20	MDST		8660
SCR/CE	10	6	W	120.00	7.11	4.90	3.60	CRNL		8691
SCR/CE	11	2	W	59.57	6.91	3.92	2.56	CRNL		8693
SCR/CE	11	3	W	57.76	5.65	4.88	2.27	CAT		8694
SCR/CL	0	13	W	1048.90	15.80	12.00	6.25	DRT		8798
SCR/SE	0	16	W	177.68	10.64	5.20	2.16	CRNL		8801
SCR/SE	5	4	W	81.60	7.42	4.23	3.02	NTSD		8727
SCR/SE	5	7	W	453.60	12.70	6.68	5.43	CRNL		8755
SCR/SE	7	6	W	161.42	10.03	6.85	2.66	NTSD?	BLACK STAIN	8629
SCR/SE	7	8	W	154.43	8.08	5.26	3.68	CAT		8632
SCR/SE	8	1	W	283.50	9.07	7.34	4.17	CRNL		8636
SCR/SE	11	7	W	311.80	8.68	7.16	3.76	NTSD		8706
SCR/SE	11	11	W	510.30	10.32	9.17	3.70	NTSD		8714

SCR CE (11)	MAX.	MIN.	MEAN	STD DEV	V
WEIGHT	301.56	50.05	188.08	101.09	0.54
LENGTH	8.74	4.82	7.52	1.28	0.17
WIDTH	8.56	3.92	5.93	1.57	0.26
DEPTH	4.71	1.98	3.80	1.16	0.31

SCR SE (8)	MAX.	MIN.	MEAN	STD DEV	V
WEIGHT	510.30	81.60	266.79	152.35	0.57
LENGTH	12.70	7.42	9.62	1.67	0.17
WIDTH	9.17	4.23	6.47	1.55	0.24
DEPTH	5.43	2.16	3.57	1.00	0.28

Retouched Flakes

Along with the utilized flakes that follow, this group is extremely heterogenous both in size and shape. Both retouched and utilized flakes are classified by whether the relevant edge is unifacially (/U) or bifacially (/B) worked or worn. Within these, they are categorized by the shape of the working edge, CC(concave), S(straight), CV(convex), SER(serrated), or P(pointed). The final level of classification refers to the edge angle of the tool, /1(0-15°), /2(15-30°), /3(30-45°), /4(45-60°), and /5(60-75°). The larger unifacially retouched flakes grade into the curved-edge and straight-edge scrapers. The working edge is most commonly convex (n=11) and less frequently straight (n=8). There are also concave edges (n=3), and serrated edges (n=2). The modal edge angle is between 60° and 75° and the median between 45° and 60°.

DESCRIPTION	EU	LVL	W/F	WEIGHT	LENGTH	WIDTH	DEPTH	MATERIAL	COMMENT	ACC#
RET FL/B-CV-4	5	4	W	55.30	6.66	4.39	1.64	MTSD		8732
RET FL/B-CV-4	7	5	F					MTSD		8621
RET FL/B-CV-5	11	7	F					CHALC		8704
RET FL/B-S-4	5	9	F					OBS		8821
RET FL/B-S-4	7	7	W	137.43	10.69	5.66	2.33	GRNL		8630
RET FL/B-S-4	8	6	W	3.31	2.97	1.71	0.60	OBS	USED ON 4 EDGES	8656
RET FL/B-S-5	8	3	W	184.75	8.48	7.03	5.61	GRNL		8641
RET FL/U-CC-4	0	5	W	255.93	8.20	7.53	3.00	GRNL	UT FL/U-S-4	8791
RET FL/U-CC-5	0	11	W	197.54	9.53	6.87	2.58	QZT		8796
RET FL/U-CC-5	5	4	W	62.24	5.12	3.91	2.87	MBST		8726
RET FL/U-CV-3	5	10	W	49.45	6.22	5.58	1.32	GRNL	UT FL/B-S-3	8772
RET FL/U-CV-4	0	23	W	45.64	5.81	4.62	1.60	GRNL		8809
RET FL/U-CV-4	9	1	W	23.22	4.20	3.55	1.48	GRNL		8657
RET FL/U-CV-5	0	14	W	258.77	8.06	7.80	3.09	MTSD		8799
RET FL/U-CV-5	5	4	F					CHALC		8723
RET FL/U-CV-5	8	5	W	191.35	9.27	5.34	4.68	GRNL		8655
RET FL/U-CV-5	10	5	W	5.46	2.93	1.89	1.44	MTV		8690
RET FL/U-CV-5	11	6	W	159.63	8.05	6.45	3.00	GRNL		8701
RET FL/U-S-4	0	27	W	107.20	7.06	5.47	1.92	GRNL		8813
RET FL/U-S-4	5	4	W	167.19	8.68	6.15	2.98	GRNL	RET FL/U-S-5	8730
RET FL/U-S-4	7	6	W	114.01	9.64	5.73	2.37	GRNL		8628
RET FL/U-S-5	5	4	W	167.19	8.68	6.15	2.98	GRNL	RET FL/U-S-4	8730
RET FL/U-SER-5	0	2	W	43.15	5.47	4.78	1.62	GRNL		8788
RET FL/U-SER-5	5	7	W	78.08	7.58	5.98	2.27	GRNL		8757

Utilized Flakes

These show no evidence of secondary chipping but do have faint traces of use-wear along one or more edge. Like the retouched flakes, they constitute a very heterogeneous group. The coding used corresponds to that of the retouched flakes, although for the utilized flakes the working edge is most commonly straight (n=34) and less commonly convex (n=17). There are also concave edges (n=4), and pointed edges (n=1). Both the mode and the median edge angle lies between 30° and 45°.

DESCRIPTION	EU	LVL	W/F	WEIGHT	LENGTH	WIDTH	DEPTH	MATERIAL	COMMENT	ACC#
UT FL/B-CC-3	7	6	W	197.94	9.54	6.06	2.67	GRNL		8663
UT FL/B-CV-4	7	3	W	5.02	4.98	1.30	0.89	RHY		8618
UT FL/B-CV-5	6	9	F					MTSD		8779
UT FL/B-P-3	9	10	F					CHALC		8678
UT FL/B-S-1	8	4	W	41.75	7.33	4.48	1.31	MDST		8652
UT FL/B-S-3	5	3	W	10.20	4.05	2.88	0.99	FELS		8720
UT FL/B-S-3	5	4	W	157.81	9.33	6.32	2.85	QZT		8729
UT FL/B-S-3	5	10	W	49.45	6.22	5.58	1.32	GRNL	RET FL/U-CV-3	8772
UT FL/B-S-3	9	9	W	162.43	9.48	8.36	2.94	GRNL		8676
UT FL/B-S-5	11	11	W	3.82	2.71	1.58	0.70	CHALC		8716
UT FL/U-CC-4	8	3	W	42.45	6.83	3.17	2.35	GRNL		8642
UT FL/U-CC-4	11	7	W	196.28	10.17	6.84	2.87	GRNL	UT FL/U-S-4	8707
UT FL/U-CC-5	7	12	W	6.89	3.53	2.27	1.00	CHALC		8635
UT FL/U-CV-2	5	4	F					MDST		8733
UT FL/U-CV-2	8	2	J	14.33	3.40	2.57	1.28	FELS		8639
UT FL/U-CV-2	10	5	W	74.01	5.80	5.27	2.50	GRNL		8822
UT FL/U-CV-3	5	3	W	0.19	1.23	0.93	0.18	OBS		8719
UT FL/U-CV-3	5	4	W	112.39	6.86	6.20	2.90	QZT		8728
UT FL/U-CV-3	5	4	W	63.71	5.51	5.04	1.97	QZT		8731
UT FL/U-CV-3	5	8	W	13.10	6.15	2.93	0.79	GRNL		8765
UT FL/U-CV-3	5	9	W	8.16	3.25	3.18	0.96	FELS		8771
UT FL/U-CV-3	11	7	W	89.43	8.04	5.54	2.70	GNG		8705
UT FL/U-CV-3	11	9	W	44.59	6.02	4.84	1.53	GRNL		8712
UT FL/U-CV-3	11	11	W	17.52	4.76	3.91	1.35	GRNL		8717
UT FL/U-CV-5	0	15	W	93.20	6.47	5.63	2.05	GRNL		8800
UT FL/U-CV-5	5	2	W	15.11	4.21	3.21	1.14	MDST		8718
UT FL/U-CV-5	5	7	W	115.19	8.57	5.95	2.76	GRNL		8756
UT FL/U-CV-5	6	12	W	46.74	8.23	3.71	1.68	MTSD		8784
UT FL/U-S-1	0	7	W	1.36	2.68	1.77	0.32	FELS		8793
UT FL/U-S-2	5	7	W	3.41	3.75	2.71	0.49	QZT		8758
UT FL/U-S-2	6	12	F					MDST		8790
UT FL/U-S-2	7	3	W	68.68	8.32	4.51	1.73	GRNL		8619
UT FL/U-S-2	9	12	W	8.18	3.96	2.51	0.90	GRNL		8685
UT FL/U-S-3	5	3	W	7.75	3.22	2.45	1.25	GRNL		8721
UT FL/U-S-3	5	9	W	16.87	4.37	3.40	1.05	GRNL		8770

DESCRIPTION	EU	LVL	W/F	WEIGHT	LENGTH	WIDTH	DEPTH	MATERIAL	COMMENT	ACC#
UT FL/U-S-3	5	10	W	8.48	4.19	1.63	1.10	QZT		8773
UT FL/U-S-3	6	8	W	1.95	2.63	1.50	0.64	QZT		8777
UT FL/U-S-3	6	12	W	2.37	2.53	1.93	0.58	MBST		8785
UT FL/U-S-3	7	5	W	28.37	4.68	4.08	1.37	GRNL		8622
UT FL/U-S-3	8	4	W	20.83	4.27	3.95	0.97	MBST		8653
UT FL/U-S-3	9	2	W	9.72	4.30	2.64	1.03	GRNL		8661
UT FL/U-S-3	11	3	W	6.16	3.56	1.85	0.80	QZM		8695
UT FL/U-S-4	0	5	W	255.93	8.20	7.53	3.00	GRNL	RET FL/U-CC-4	8791
UT FL/U-S-4	5	3	W	17.96	5.33	3.48	0.84	GN		8722
UT FL/U-S-4	5	7	W	42.35	7.34	4.62	1.32	GRNL		8759
UT FL/U-S-4	6	11	W	12.61	3.17	3.04	1.20	MBST		8783
UT FL/U-S-4	7	1	W	28.85	4.78	4.22	3.52	MBST		8617
UT FL/U-S-4	9	2	W	23.44	4.87	3.43	1.32	QZT		8659
UT FL/U-S-4	11	4	W	1.94	3.05	1.28	0.50	MTV		8696
UT FL/U-S-4	11	7	W	196.28	10.17	6.84	2.87	GRNL	UT FL/U-CC-4	8707
UT FL/U-S-5	0	25	W	41.48	6.60	3.40	1.75	MBST		8811
UT FL/U-S-5	5	6	W	204.38	7.91	7.60	3.55	QZT		8749
UT FL/U-S-5	5	8	W	34.52	6.49	3.53	1.55	GRNL		8766
UT FL/U-S-5	6	9	W	147.11	7.35	7.50	2.10	GRNL		8778
UT FL/U-S-5	6	10	F					QZM		8780
UT FL/U-S-5	9	2	W	19.71	5.05	1.17	1.08	MBST		8658

Projectile Point

The single obsidian projectile point fragment recovered is part of the tip of what appears to have been originally a small triangular point. It's weight when whole would most likely have been less than 3.5 g and it would therefore fall into the range of arrow heads (Fenenga 1953). A hydration measurement of 7.1 microns was obtained from the piece (see Section 5.2). It is depicted in Figure 1.

POINT/SMALL?	7	11	F					OBS	TIP	8634

Cores

Only two cores were found, unmodified except for the effects of flake removal. This is in contrast to the large numbers of core tools found. Given the quantity of debitage recovered (n=85), it would appear that, despite the infrequency of cores, flake and core tool production was an important activity at the site, and that the core reduction technology employed was designed to produce both flake and core tools in the same process.

DESCRIPTION	EU	LVL	W/F	WEIGHT	LENGTH	WIDTH	DEPTH	MATERIAL	COMMENT	ACC#
CORE	8	2	W	96.42	5.57	4.71	3.94	FELS		8638
CORE	11	7	W	32.17	4.76	2.71	2.45	CHALC		8703

6.4 Hammerstones

A hammerstone or hammer tool is formed through the action of perpendicular impact of a stone against another hard object. Hammerstones have a number of inferred functions, but two of the most common are their use in the "sharpening" of ground stone implements and in the manufacture of chipped stone tools.

As manos and metates are used, their wear surfaces become polished as a result of friction between the two implements. This process is accelerated by the oil released from the seeds and other foods being ground. This oil could also account for some of the discoloration seen on the ground stone implements. The surfaces of the ground stone tools, therefore, become so slick that it becomes very difficult to hold and grind seeds. Thus, these surfaces must be roughened periodically to facilitate grinding. Hammerstones are used to batter the surfaces of such ground stone implements to roughen them and make them useable.

The second function of hammerstones is in producing chipped stone tools. A core is prepared by striking flakes off of a cobble using a hard hammer. Secondary flakes are then removed which can be used immediately as tools, (such as scrapers or knives), or further reduced, trimmed, or shaped into specific stylized tools (such as bifaces, scrapers, or projectile points).

Hammerstones are classified as Hammer/Choppers, Hammer/Cobbles, or Hammer/Cores. Hammer/Choppers are triangular or, more commonly, diamond-shaped in cross-section with evidence of battering along edges formed by two flat surfaces intersecting at an angle typically between 60^{o} and 70^{o}. Hammer/Cobbles retain most of their cortex, but show battering wear along short segments of a dull edge or pointed end (/P) of elongated pebbles. Hammer/Cores show little cortical retention, are irregular in cross-section, and have impact wear along several short or long segments of typically dull, rounded edges. Two of the Hammer/Choppers also functioned as scraper planes. Hammer/Cobbles are typically associated with the production of other chipped stone artifacts, while Hammer/Cores are associated with the milling stone tool complex as they are used to "sharpen" ground stone implements. Hammer/Choppers, as their classification implies, appear to have had a chopping or pulping function.

DESCRIPTION	EU	LVL	W/F	WEIGHT	LENGTH	WIDTH	DEPTH	MATERIAL	COMMENT	ACC#
HAM/CH	0	18	W	368.88	9.25	6.60	5.27	GRNL		8803
HAM/CH	0	30	W	652.63	9.00	8.02	7.00	GRNL		8612
HAM/CH	0	34	W	340.00	7.28	5.57	4.80	GRNL	SCR/P/2A	8616
HAM/CH	5	4	W	396.90	10.21	9.93	3.78	CAT		8737
HAM/CH	5	6	W	425.63	8.10	5.35	5.04	GRNL		8748
HAM/CH	8	4	W	265.53	8.25	5.91	5.11	GRNL		8646
HAM/CH	9	8	W	295.99	7.00	6.04	5.63	GRNL	SCR/P/2A	8669
HAM/CH	9	9	W	652.00	10.30	8.37	6.14	CAT		8673
HAM/CH	9	11	W	397.25	8.15	6.20	4.91	GNE		8680
HAM/CH	11	6	F					GRNL		8700

DESCRIPTION	EU	LVL	W/F	WEIGHT	LENGTH	WIDTH	DEPTH	MATERIAL	COMMENT	ACC#
HAM/COB	0	12	W	454.00	7.50	7.15	5.94	MBST		8797
HAM/COB	5	8	W	567.50	8.69	6.17	6.25	CAT		8763
HAM/COB	5	9	W	766.13	10.00	8.41	6.75	CAT		8767
HAM/COB	8	4	W	144.48	7.23	6.00	2.28	CAT	FLAT	8647
HAM/COB	11	8	F					CAT	MANO/U	8708
HAM/COB/P	0	22	W	368.88	9.50	5.32	4.34	GRNT		8808
HAM/COB/P	9	10	F					SCH		8679
HAM/CORE	0	19	W	595.88	8.95	7.07	7.02	GRNL		8805
HAM/CORE	5	4	W	624.25	9.78	8.67	5.73	GRNL		8738
HAM/CORE	5	6	W	709.38	9.10	7.06	6.80	FELS		8747

HAM/CH (9)	MAX.	MIN.	MEAN	STD DEV	V
WEIGHT	652.63	265.53	421.66	140.17	0.33
LENGTH	10.30	7.00	8.62	1.17	0.14
WIDTH	9.93	5.35	6.89	1.54	0.22
DEPTH	7.00	4.80	5.30	0.90	0.17

HAM/CORE (3)	MAX.	MIN.	MEAN	STD DEV	V
WEIGHT	709.38	595.88	643.17	59.07	0.09
LENGTH	9.78	8.95	9.28	0.44	0.05
WIDTH	8.67	7.07	7.60	0.93	0.12
DEPTH	7.02	5.73	6.52	0.69	0.11

HAM/COB (5)	MAX.	MIN.	MEAN	STD DEV	V
WEIGHT	766.13	144.48	460.20	230.85	0.50
LENGTH	10.00	7.23	8.58	1.21	0.14
WIDTH	8.41	5.32	6.61	1.20	0.18
DEPTH	6.75	2.23	5.11	1.82	0.36

6.5 Miscellaneous

The two small flat pieces of asphaltum weigh a total of only 0.46 g. they appear to have originally adhered to a smooth surface.

Five lithics are classified as "paint rocks". The two skarn examples appear to have been ground and would have produced a white powder.

DESCRIPTION	EU	LVL	W/F	WEIGHT	LENGTH	WIDTH	DEPTH	MATERIAL	COMMENT	ACC#
ASPHALTUM	10	5	F					ASPH	2 SMALL FLAT PIECES	8689
PAINT ROCK	5	5	W	9.10	2.69	1.97	1.15	GN		8743
PAINT ROCK (RED)	10	2	W	181.73	9.18	4.73	4.01	MTSD		8687
PAINT ROCK (RED)	10	2	W	132.54	6.30	3.70	3.28	MTSD		8688
PAINT ROCK?	11	7	W	1020.00	12.00	11.00	5.75	SKARN		8815
PAINT ROCK?	11	11	W	567.00	10.13	8.71	4.58	SKARN	HAND SHAPED	8713

6.6 Lithic Raw Materials

Table 5 lists the lithic raw materials used for each class of artifact. Distinct functions of multiple-purpose tools are enumerated separately in Table 5. Following Digua (Appendix D), the materials used for the stone tools recovered have been classified into three groups based upon the proximity of their sources to the site. "Local" materials consist of those found in their natural, unaltered form both on and around the site. Most of these were abundant in all of the natural samples collected. Metabasalt and workable granulite, on the other hand, are scarce in the natural samples and may have been intensively searched for by the sites' inhabitants or more easily recognized by them (ibid). These materials have washed out of the zones of Precambrian igneous and metamorphic rocks, mylonite, and the granitic batholith that comprises the portion of the San Gabriel Mountains that rises behind the site.

	CAT	DET	GN	GNE	GNG	GRDR	GRNL	GRNT	MBST	MTSD	MTV	QZM	QZT	SCH	AND	FELS	RHY	SDSTA	VCFG	CHALC	CHERT	OBS	TOTAL
							LOCAL										*REGIONAL*				*DISTANT*		
MANO	4	15	2	1	1	4	0	3	0	0	0	0	0	0	1	0	0	0	0	0	0	0	31
METATE	3	4	3	1	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	15
MORTAR	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1	1	0	0	0	4
PESTLE	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2
M GRST	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
SCR/F	1	0	2	0	1	0	13	1	1	6	0	0	2	0	0	0	0	0	0	0	0	0	27
SCR/CE	1	0	2	0	0	0	8	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	13
SCR/SE	1	0	0	0	0	0	3	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	8
SCR/CL	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
RET FL	0	0	0	0	0	0	14	0	1	3	1	0	1	0	0	0	0	0	0	2	0	2	24
UT FL	0	0	1	0	1	0	22	0	10	2	1	2	8	0	0	4	1	0	0	3	0	1	56
POINT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
CORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	2
HAM/CH	2	0	0	1	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
HAM/CB	4	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	7
HAM/CR	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3
TOTAL	16	20	10	3	5	4	70	8	14	17	2	2	11	2	2	6	1	2	1	6	0	4	206
PERCNT	7.77	9.71	4.85	1.46	2.43	1.94	33.98	3.88	6.80	8.25	0.97	0.97	5.34	0.97	0.97	2.91	0.49	0.97	0.49	2.91	0.00	1.94	100.00
DEBIT.	0	0	0	0	0	0	41	0	6	3	2	1	17	0	0	4	0	0	0	4	6	1	85

TABLE 5: ARTIFACT TYPES BY LITHIC MATERIAL.

"Regional" materials include rocks that could be found between five and 20 km away. These probably originated in the hypabyssal rocks exposed along the El Luis Ridge separating Cucamonga and San Antonio Canyons 6.5 km (linear distance) northwest of the site. An alternate and less likely source for these rocks could lie in the Glendora Volcanics west of San Dimas Canyon and 20 km west of the site. Expeditions up Cucamonga or San Antonio Canyons could well have been made by the same people who later manufactured and used the tools found at SBr-895.

Unlike the locally and regionally available lithics, "Distant" rocks more likely passed through a series of transactions before coming to rest in the hands of the people of SBr-895. The obsidian and chalcedony had their origins in Mojave Desert sources and were probably funneled through the Cajon Pass. Results of the neutron activation of the obsidian are pending. The dark "chalcedony" and chert would have come from the closest marine sedimentary unit, probably in the northern Santa Ana Mountains.

A more detailed account of the geologic history of the area as it relates to lithic resources used by the inhabitants is provided in Appendix D.

As can be seen in Table 5, by far the most common material is granulite, accounting for 34% of the tools including the bulk of both chipped stone tools and hammerstones. Granulite, it will be recalled, occurs in the natural rock samples, but is not abundant. Not surprisingly, all metates and fragments are of locally available materials, as are 19 of the 20 hammerstones and fragments. Distant materials are confined to the smaller chipped stone tools. The bottom row of Table 5 gives the number of pieces of debitage for each material.

Table 6 summarizes the information of Table 5, with artifacts grouped into groundstone, chipped stone, and hammerstone categories. Local materials were used for 89.3% of the tools recovered and 82.4% of the debitage. Regional materials were used for only 5.8% of the tools and 4.7% of the debitage. The distant materials comprise the final 4.9% of the tools and 12.9% of the debitage.

Table 6 also includes debitage counts and a debitage/chipped stone tool ratio for each lithic source group. The latter provides a crude measure of the relative degree of chipped stone tool reduction that took place at the site with materials of each group. Distant materials (particularly chalcedony and chert) have an unusually high value on this measure; this indicates that they were brought to the site in unfinished form, perhaps as general-purpose roughed out blanks, and worked at the site to produce tools suited to specific tasks as they arose. The obsidian is an exception to this, with only one piece of debitage for the four tools. The sharpness of obsidian cutting edges may have encouraged the use and curation of almost every flake produced.

	LOCAL #	LOCAL %	REGIONAL #	REGIONAL %	DISTANT #	DISTANT %	TOTAL #	TOTAL %
GRDST.	49	90.74	5	9.26	0	0.00	54	100.00
CHST.	116	87.88	6	4.55	10	7.58	132	100.00
HAMST.	19	95.00	1	5.00	0	0.00	20	100.00
TOTAL	184	89.32	12	5.83	10	4.85	206	100.00
DEBIT.	70	82.35	4	4.71	11	12.94	85	100.00
DEB/CHS	0.60		0.67		1.10		0.64	

TABLE 6: Artifact/Material Summary Table.

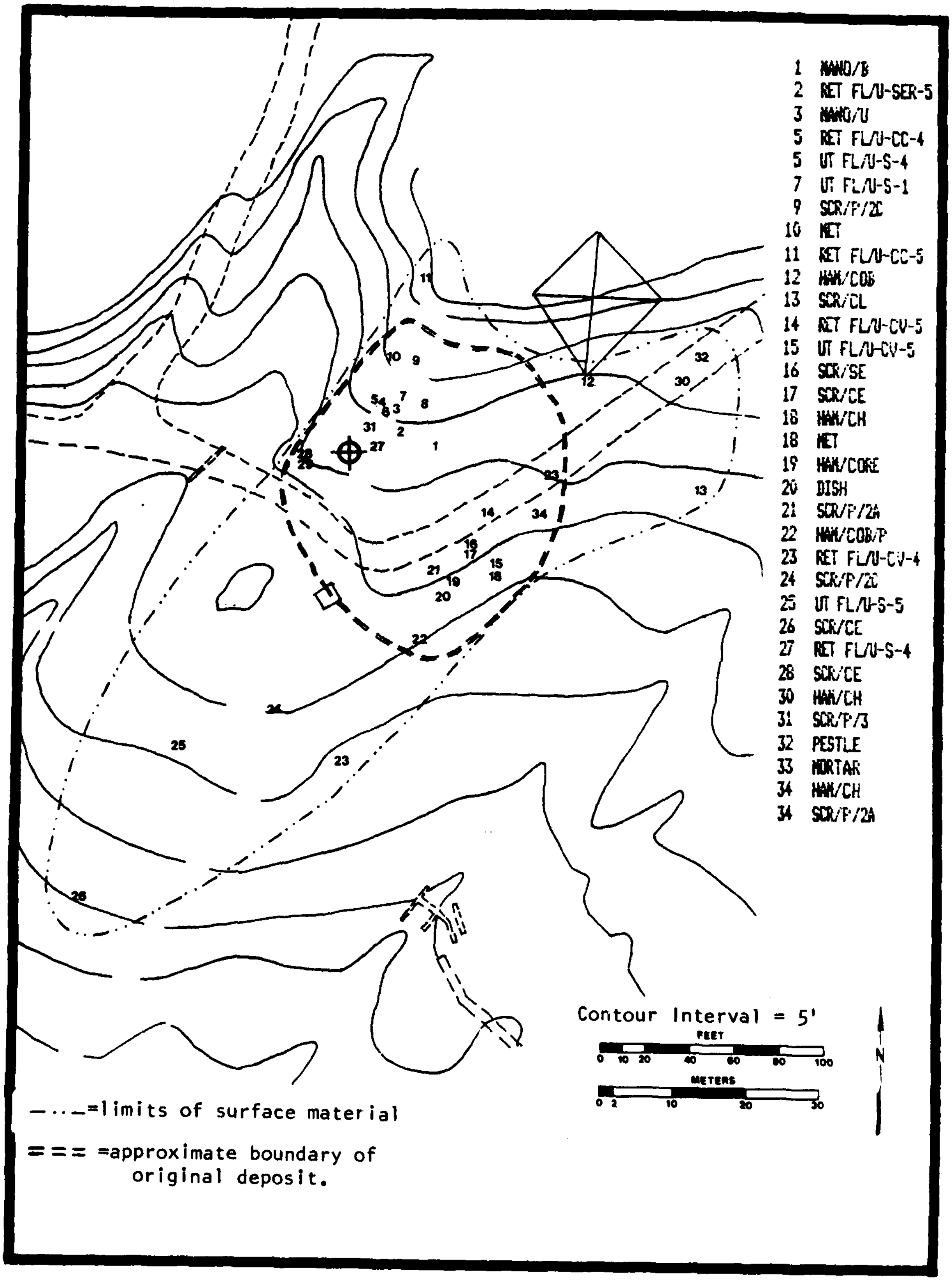
7.0 SPATIAL RELATIONS AMONG THE ARTIFACTS

The positions of items gathered in the surface collections are displayed in Map 5. A line drawn encompassing all these points circumscribes an area of approximately 3700 m^2 As was discussed in Section 1.4, the present disagregation of the deposit is the product of modern scraping and excavation. The area of the deposit before these modern disturbances is difficult to estimate precisely, but between 650 m^2 and 1300 m^2 is a reasonable range, with the actual area probably closer to the lower estimate.

The positions of the artifacts on the modern surface have only the faintest correspondence to their original locations, and it would be senseless to treat surface patterning as a reflection of an activity surface.

The first page of Appendix B (the catalog sorted by provenience) includes more detailed information on each of the surface items (EU=0, LVL=field number).

Table 7 lists the numbers of artifacts in each category found on the surface and in the excavations (by strata, see Appendix E). Since the excavation units were dug in 10 cm increments following the contour of the ground surface (and not following the soil strata), it was nesessary to estimate that level break which most closely corresponded to each natural stratum boundary for each unit. Table 12 in Appendix E links the arbitrary excavation levels of each unit to the natural strata to which they most closely correspond. Inasmuch as stratum boundaries tended to be uneven, this procedure must have the effect of combining materials from distinct portions of the deposit and muddling artifact proportion comparisons. It is, however, the best



MAP 5: Positions of Surface Materials and Site Boundaries.

	STR I	PERCENT	STR II	PERCENT	STR III-	PERCENT	SURFACE	PERCENT	**TOTAL**	PERCENT
MANO	2	7.41	20	21.28	7	13.46	2	6.06	31	15.05
METATE	2	7.41	6	6.38	5	9.62	2	6.06	15	7.28
MORTAR	0	0.00	3	3.19	0	0.00	1	3.03	4	1.94
PESTLE	0	0.00	1	1.06	0	0.00	1	3.03	2	0.97
MISC GRST	0	0.00	0	0.00	1	1.92	1	3.03	2	0.97
SCR/P	1	3.70	13	13.83	8	15.38	5	15.15	27	13.11
SCR/CE	3	11.11	6	6.38	1	1.92	3	9.09	13	6.31
SCR/SE	1	3.70	4	4.26	2	3.85	1	3.03	8	3.88
SCR/CL	0	0.00	0	0.00	0	0.00	1	3.03	1	0.49
RET FL	2	7.41	13	13.83	3	5.77	6	18.18	24	11.65
UT FL	15	55.56	17	18.09	20	38.46	4	12.12	56	27.18
POINT	0	0.00	0	0.00	1	1.92	0	0.00	1	0.49
CORE	1	3.70	1	1.06	0	0.00	0	0.00	2	0.97
HAM/CH	0	0.00	6	6.38	1	1.92	3	9.09	10	4.85
HAM/COB	0	0.00	2	2.13	3	5.77	2	6.06	7	3.40
HAM/CORE	0	0.00	2	2.13	0	0.00	1	3.03	3	1.46
TOTAL	27	100.00	94	100.00	52	100.00	33	100.00	206	100.00
#/CUBIC M	2.25		8.70		7.39				5.80 EXCL.SUR	
DEBITAGE	41		33		9		2		85	
#/CUBIC M	3.42		3.66		1.28				2.78 EXCL.SUR	

TABLE 7: Artifact Types by Excavation Strata and Surface Collection.

approximation possible to link artifact provenience to stratification and is certainly preferable to combining for analytic purposes items of common level depth from all units across the site. When the assemblage is divided by strata, the actual number of categorized artifacts in each becomes quite small. In order not to mask this fact, both stratum percents and the raw numbers upon which they are based are included in Table 7, but the data should be approached with these limitations in mind.

Differences between surface and excavation artifact proportions are attributable to the varying conditions of collection, with the surface materials including higher proportions of larger, more visible items.

Table 7 also provides volumetric density measures in terms of the numbers of artifacts or debitage per cubic meter of excavation volume for each stratum. The "Stratum 111-" column also includes material from lower levels since these contained insufficient numbers of items to warrant separate treatment.

As might be expected, if the reconstruction of the depositional history of the site is correct, Stratum 1 contained the lowest artifact density, but it also contained a surprisingly high debitage density. The majority of tools found in Stratum 1 are small utilized flakes. There are slight variations in the proportions of artifact classes between Stratum 11 and Stratum 111, but in general there is little clear cut differentiation. All four mortar and pestle fragments recovered in the excavation came from Stratum 11. This suggests that the mortar/pestle complex, and implied balanophagy, might not have yet been part of the subsistence repertoire of the site's inhabitants during the time the strata below Stratum 11 were deposited.

Within the individual excavation units, peak artifact densities were found in Stratum 11 levels. In the central area of the site (involving Unit #'s 5, 6, 7, 9, and 11) the NW - SE trend in the modern surface correlates with the depth of peak artifact density (deeper downslope), the maximum depth of the deposit below the surface (deeper upslope), and unit total artifact density (greater downslope).

8.0 FAUNAL ANALYSIS

A striking characteristic of the deposit is the infrequency of animal bone it contained. Table 8 summarizes the taxa identified and Table 9 provides more specific information on the provenience of each element. Much of the bone was so highly fragmented as to be unidentifiable as to taxon or element. Notably absent are the bones of either migratory or resident birds. No worked bone or human bone was recovered. The faunal identification was accomplished by Dr. Hugh Wagner.

Only seven taxa are represented, at least two of which are natural residents of the soil and whose remains may have nothing to do with the site's prehistoric inhabitants. In no case does the minimal number of individuals exceed one. All remains therefore, could be the product of only seven distinct animals.

All deer bone recovered, with the single exception of an uncertainly identified tooth fragment, are from the lower ends of either fore or hind limbs (from the carpals or tarsals on down). These seem more a souvenir, perhaps part of a deer-hoof rattle, than direct evidence of what was consumed at the site itself. The deer was probably butchered elsewhere. If any meat was brought back to SBr-895, it had been dressed, probably dried, and separated from the bone. This opens the possibility that the rarity of bone (and projectile points) in the deposit does not necessarily mean that hunting did not play a role in the diet of its inhabitants (see Section 9.2).

Subphylum Class Order Family Genus Species	Common Name
Vertebrata	
Reptilia	
Ophidia	
Colubridae Family	Related to King Snakes
Mammalia	
Logomorpha	
Leporida	
Lepus californicus	Black-tailed Hare
Sylvilagus bachmani	Brush Rabbit (Cotton Tail)
Rodentia	
Sciuridae	
Spermophilus beecheyi*	Beechey Ground Squirrel
Geomyidae	
Thomomys bottae*	Botta Pocket Gopher
Carnivora	
Canidae	
Vulpus sp.	Fox
Artiodactyla	
Cervidae	
Odocoileus sp.	Deer

* locally resident, expectable in soil horizon.

TABLE 8: Faunal List

PROVENIENCE	TAXON	ELEMENT
E.U.5		
10-20 cm	? Odocoileus	Phalanx Fragment
30-40 cm	Large Mammal	Bone Fragments
40-50 cm	Mammalia	Bone Fragments
50-60 cm	Mammalia	Bone Fragments
70-80 cm	Lepus californias	Dista. Left Humerus
	? Odocoileus	? Tooth Fragment
80-90 cm	Odocoileus	Carpal, Left Cuneiform
90-100 cm	?	Bone Fragments
E.U.6		
20-30 cm	Sylvilagus bachmani	Left Dentary, Right Maxillary
	Colubridae	Vertebra
90-100 cm	Thomomys bottae	Right Rostrum
E.U. 7		
10-20 cm	?	Bone Fragments
20-30 cm	Large Mammal	Bone Fragments
30-40 cm	Large Mammal	Bone Fragments (1 burnt)
50-60 cm	Large Mammal	Bone Fragments
E.U. 9		
10-20 cm	Thomomys bottae	Left Dentary, Right Dentary
20-30 cm	Spermophilus beecheyi	Left Proximal Femur
	Sylvilagus bachmani	Right Dentary Fragment
	Large Mammal	Bone Fragments
30-40 cm	Lepus californicus	Exdentulous Palate
50-60 cm	Large Mammal	Bone Fragments
60-70 cm	Large Mammal	Bone Fragments
70-80 cm	Large Mammal	Bone Fragments
80-90 cm	Large Mammal	Bone Fragments
100-110 cm	Large Mammal	Bone Fragments
110-120 cm	Mammalia	Bone Fragments
E.U. 10		
40-50 cm	Mammalia	Bone Fragments
E.U. 11		
30-40 cm	Vulpes	Right Proximal Radius
80-90 cm	? Odocoileus	Tarsal (Burnt, L. Unciform Fragment

TABLE 9: Bone Provenience

9.0 SUBSISTENCE AND SETTLEMENT IN COMPARATIVE PERSPECTIVE

9.1 Sites Reported in the Vicinity of CA-SBr-895

Between four and six km southwest of SBr-895 near a small rise on the valley floor known as Red Hill lies a cluster of ten recorded prehistoric sites. These are concentrated on either side of the Cucamonga Creek channel at elevations between 1250' (381 m) and 1440' (439 m) overlooking a lower-lying area to the southwest once covered by a spring-fed marsh. This is the location of the historic Cucamonga Village Complex, a major population center of the greater valley at the time of missionization.

Thousands of artifacts have been recovered from two of the sites (SBr-270, SBr-901) in the course of field classes conducted by Dr. Thomas Blackburn of Cal Poly, Dr. Hal Eberhart of CSU,LA, and Dr. Bernice McAllister of Chaffey College. These investigations have revealed occupations as early as the Milling Stone period, and a sample of scattered charcoal from SBr-901 dates to about the time of Christ (R. Sauls, CSU,LA, personal communication). Cogged stones, usually associated with some portion of the Milling Stone period, are reported on the initial site record forms for SBr-901 and SBr-902.

Six of the sites (SBr-897 to SBr-902, inclusive) were first officially recorded as a result of the survey of the area reported by Martz (1976). Three sites were recorded after that research (including SBr-1608, SBr-1609, and SBr-2298). The last two are evidenced by single artifact finds, and the first by reports of manos and metates.

Although most of the evidence of prehistoric occupation in the Red Hill area has been destroyed by modern construction and landscaping, it is clear that the initial occupation took place before 2000 years ago. It is likely that the span of occupations at SBr-895 was contemporaneous with some portion of the longer range of settlement around Red Hill.

A second group of three sites involves those situated overlooking the valley at the mouths of the canyons exiting the San Gabriel Mountain foothills. These sites are strung out between the 2200' (671 m) and 2400' (732 m) elevation contours and are all virtually equidistant (4-6 km) to the Red Hill group. This group includes SBr-895 and SBr-2365, (3.8 km) to the west at the mouth of Cucamonga Canyon (north of the Red Hill group) and SBr-896, (6 km) west of SBr-895 (northwest of the Red Hill group). All sites are within one hour's walk of each other and of Red Hill.

The final site in the area, SBr-1593, is located in a somewhat anamolous position midway between SBr-895 and the Red Hill sites at an elevation of about 1660' (506 km). The site record form reports an extensive site with metates, scrapers, choppers, and hammerstones.

9.2 Subsistence-Related Activities

From all available evidence, the processing of various wild plant foods was the predominant subsistence-related activity conducted at the site. The rarity of both projectile points and animal bone in the deposit indicates that hunting probably played a minor role. This is not to say that the people who camped at SBr-895 did not often hunt, but merely that if they did, they left most of the remains elsewhere. The few bones that were recovered are attributable to animals that normally inhabit either the Sage-scrub or Chaparral Plant communities and include no identified bird or fish bones.

With a relatively limited repertoire of stone tools available, it is probable that each was used for a variety of purposes. While acknowledging the likely multiple functions of each, recall (Section 2.2) that Kowta (1969) linked the tools typical of milling stone assemblages (scraper planes, manos, metates, and hammerstones) to various stages in the processing of yucca and agave for food and cordage.

Yucca whipplei (Spanish bayonet or Our Lord's Candle) are scattered sparsely across the steep hillside slopes above the site. Among the Cahuilla, the Gabrielino's neighbors in the mountains and interior valleys to the southeast, these plants bloom in April and May and die soon after blooming (Bean and Saubel 1972:150-151). Stalks and blossoms were used for food, the stalks roasted in rock-lined pits. Gathering could take place for several weeks at any one place, or much longer if the family collected at different altitudes. The dried product could be ground and mixed with water to form cakes that could be stored for winter use of for trading (Balls 1962:46-47).

As was mentioned in Section 4.0, a discontinuity in the strata exposed in a wall of the trench dug in 1975 for the large pipeline that runs across the site was interpreted as the remains of a possible roasting pit. We were not able to relocate this feature.

A number of artifacts exhibit "black stain" (see Section 6). This is actually a thin dull dark brown discoloration that might be interpreted as the product of some interaction with the soil, except for the fact that the stain inevitably appears on a working surface of the tool. This stain is found on some metates (Plate 3) and scraper planes, and also on some manos and hammerstones. If this stain is the product of reaction of the rocks with the organic materials crushed by the tools, Kowta's connection of these tools is supported.

The recovery of five unbroken metates, both slab and basin-shaped, is an important clue to the nature of settlement at SBr-895. Weighting up to 44.5 kg., the metates are not practically portable over any distance. For some, considerable effort was invested in their shaping alone. This probably offered an incentive to the Indians to return year after year, not only to the targeted environmental zone, but also to re-occupy the same site in order to avoid the necessity of duplicating the labor investment. This, in turn, suggests localized use-rights to the products of the wild plants of the area. The metates (along with depth of the cultural deposit) suggest that the site was re-occupied repeatedly, probably by a single kin group and its descendants. At some point this cycle was broken and the deposit buried in subsequent colluviation.

Mortar and pestle fragments, although not abundant, are present at SBr-895. Oak, particularly coast live oak (Quercus kellogii), is present, although not in any great density, along the canyon bottoms exiting the foothills to the west and east of the site.

The inauguration of acorn exploitation must have had radical effects on the structure of existing settlement systems. One of the situations that may produce a central-based wandering community pattern is the introduction of a storable or preservable seasonally abundant wild food harvest (Beardsley et al. 1956:138). Both acorn meal and cakes are preservable, and unprocessed acorns may be stored in granaries. Acorns came to play a major role in the prehistoric diet in most of California. Stored acorns, or their processed products, were often the most important foods during the winter months. Constraints imposed by the brief harvest period, and overwhelming abundance, would have encouraged a trend toward sedentism (Beardsley et al. 1956:138; White 1963: 116; Bean and Saubel 1972:122). A large number of harvesters are needed to take advantage of the potential yield and to store enough to last through the winter. The location of settlements is also constrained by the necessity of sufficient amounts of fresh water for the leaching process.

Among the Cahuilla, the acorn harvest took place during October or November, before significant winter rain could rot acorns already on the ground (Bean and Saubel 1972:125). Since the groves were often located some distance (8-20 km) from the villages, the majority of the villages' inhabitants (men, women, and children), would travel to the groves and camp there for one to four weeks.

The use rights to groves were owned by lineages, and individual trees by families within a lineage. Each woman had her own bed-rock or portable mortars and pestles along with other non-durable equipment. The portable mortars were often left at a camp, turned upside down over a pestle. Mortars and pestles were used both the pulverize the dried acorns into meal prior to leaching and to re-grind the baked meal cakes.

The dried acorns themselves could be transported back to the village without any further processing, and stored in granaries through the winter. This often happened if rains interrupted the drying during harvest.

All other things being equal, the probability that unground acorns were brought back to a central base rather than processed at a grove-side camp is likely to be inversely proportional to the distance between the base and the groves. SBr-895, and a long stretch of the valley/foothill border, lie within one hour's walk (4-6 km) of the Cucamonga Village Site Complex of the valley.

The relative prominence of mortars and pestles in the assemblages of sites near the canyon mouth oaks may not directly reflect the importance of acorns in the diets of the inhabitants of those sites. This is so because mortars and pestles mark the locations of specific stages in acorn processing, and these activities may have been conducted at sites some distance from the trees themselves.

As has been mentioned, mortar and pestle fragments are present but infrequent in the SBr-895 assemblage. But even if no examples of these had been found at the site, we would not necessarily be able to conclude that acorn exploitation was not practiced since unprocessed acorns might have been transported to a nearby central base, for example, for processing.

9.3 Assemblages in the Region

Four assemblages pre-dating the Late Prehistoric period have been described from three sites in the San Gabriel Valley 30 km west of SBr-895 (Eberhart 1962; Eberhart and Wasson 1975; Wasson et al. 1978), and one in the Cajon Pass 18 km northeast (Kowta 1969). Table 10 summarizes the assemblage characteristics of the four sites and SBr-895. Although precisely quantified comparisons are hindered by variable conditions of recovery and classification, generalizations are possible.

The sites all share the predominance of the scraper plane/hammerstone/mano/metate tool complex in their assemblages (classic Milling Stone Horizon characteristics). All similarly share a rarity or absence of animal bone remains. The Sayles Site is unusual in that although bone is uncommon, projectile points are relatively numerous. Only Mesarica shares with SBr-895 any evidence of themortar/pestle tool complex, this from a single uncertainly identified mortar fragment.

TABLE 10: COMPARATIVE SITE CHARACTERISTICS

	WEST				EAST
	SAN GABRIEL VALLEY			POMONA VALLEY	CAJON PASS
	MESARICA[1]	SASSONE[2] LAn-339	WILSON[3] LAn-518	CHAFFEY-HILLSIDE SBr-895	SAYLES[4] SBr-421
ASSEMBLAGE					
Agave/yucca tool kit	common	common	common	common	common
Mortars/pestles	1?mortar	absent	absent	present	absent
Projectile points	absent	rare	rare	rare	common
Animal bone	absent	rare	rare	rare	rare
Area of Surface Scatter	less than 1 ha.	less than 1 ha.	less than 1 ha.	less than 1 ha.	greater than 15 ha.
Assigned Period	Milling Stone	Milling Stone ca.3000 B.C.	Middle Milling Stone ca.3000 B.C.	cor. C-14 A.D.530±70	Late Milling Stone ca.1000B.C.-A.D.1000
Obsidian Hydration Readings	-	7.2-8.3 mic. (n=4)	-	5.4-7.1 mic. (n=5)	-
Historic Ethnicity of Area	Gabrielino	Gabrielino	Gabrielino	Gabrielino (Border?)	Serrano

Notes Sources
1 Eberhart (1962)
2 Eberhart & Wasson (19;5)
3 Wasson et al. (1978)
4 Kowta (1969)

Although the sources do not distinguish between the area of the modern surface scatter and the size of the original deposit, the three San Gabriel Valley sites seem roughly the same size as SBr-895, while the Sayles Site is at least twenty times as large. The topographic position of the San Gabriel Valley sites is more similar to that of SBr-895; all are located in the narrow foothill zone overlooking the valley floor.

In the absence of radiocarbon dates, the researchers involved were forced to rely on typological cross-dating with sequences developed from stratified sites much nearer the coast (e.g., Rogers 1929; Walker 1951; Treganza and Malamud 1950; Johnson 1966). On this basis, all are said to have their closest affinities with Milling Stone Horizon assemblages.

Kowta characterized the Sayles Site as a Late Milling Stone assemblage that represents a survival of the pattern in the interior long after it had been replaced nearer the coast (1000 B.C. - A.D. 1000). He explained the abundance of projectile points, and the inferred importance of hunting, as the product of geographical and temporal differences with the coastal assemblages. No attempt was made to reconcile this picture with the paucity of animal bone recovered.

The assemblages from the San Gabriel Valley sites are very similar to that of SBr-895. With a smaller sample size one can easily imagine missing evidence of mortars and pestles at SBr-895 altogether. Yet by virtue of their supposed affinities with portions of the coastal sequence, the age of the San Gabriel Velley sites has been estimated at some 3500 years earlier than the radiocarbon date for the occupation of SBr-895.

The lesson in all this is that dating inland assemblages by their relationships to similar components in coastal sequences is a very risky step. Not only may the timing of the introduction of certain traits and their inferred subsistence correlates vary across space and regional ecology, but the occurrence of the traits themselves will vary among the settlements of the same system. The absence of either mortars and pestles, or indications of hunting, in an assemblage is simply an unreliable indication of its age.

9.4 The Context of Settlement at CA-SBr-895

Where does SBr-895 stand in relation to Wallace's chronology? The artifact inventory looks very much like Milling Stone assemblages except for the presence of six mortar and pestle fragments, one small obsidian arrow point, and two small bits of asphaltum. Traits shared include an abundance of manos and metates, few projectile points or bone and shell artifacts, and little animal bone. The presence of mortars, pestles and asphaltum is associated with assemblages of the Intermediate Cultures or Late Prehistoric periods. Usage varies as to whether the mere presence of mortars and pestles marks these assemblages, or whether they must be common (or even predominate) proportionally over manos and metates. SBr-895 lacks evidence of the importance of hunting said to characterize Intermediate Cultures assemblages, either in the form of animal bone refuse or significant numbers of projectile points. Items that distinguish Wallace's Late Prehistoric period are conspicuously absent.

Missing from most discussions of comparative chronology is a perspective considering entire settlement systems. Implicit in all inter-assemblage comparisons is that the sites being compared held similar positions in their respective settlement systems. Ecological factors are considered as affecting assemblage variability, but these have usually been dealt with as regionalized variables inhibiting or encouraging the spread of certain traits.

A site cannot be characterized as representative of a certain era in a given region without reference to the role it played in its settlement system and its relationship to environmental correlates, specifically seasonally abundant food resources.

The following reconstruction places SBr-895 in a highly simplified model of an hypothesized settlement system. Although tentative in its details, it illustrates the kind of information that must be included in discussions of assemblage comparison.

SBr-895 probably represents a specialized plant processing camp of a small family group probably based at a larger, more permanent settlement near Red Hill. Particularly targeted plant resources became available at two times of the year: (1) in April, May, and June when the yuccas bloomed and, (2) October and November when the acorns were ready for harvest. The site was probably re-occupied periodically by the same group of close relatives for periods of up to several weeks during the spring, and for brief durations in the fall.

It is proposed that the Central-Based Wandering pattern of settlement hinted at in ethnohistoric records of the Gabrielino, and more thoroughly described for their neighbors, had an antiquity of at least 1300 years in the Pomona Valley. More specifically, it is proposed that settlements at Red Hill served this central-base function. Winter is the most likely season for population aggregation at the Red Hill sites, but some occupation may have continued throughout the year.

If this reconstruction is correct, the hypothesized contemporaneous component at Red Hill should contain evidence of a much larger population and a less specialized range of tools than was found at SBr-895. We would expect that scraper planes would make up a smaller portion of the assemblage than at SBr-895.

The rarity of evidence of hunting at SBr-895, a trait often used as a temporal marker, is here interpreted as more a reflection of the highly specialized nature of the occupation. If this is so, the contemporaneous base at Red Hill might be expected to contain both a higher proportion of projectile points and more animal bone refuse including, for example, the bones of birds taken from the nearby marsh. Mortars and pestles, insofar as they mark the locations of certain stages in acorn processing and not necessarily of the oak trees themselves, would be expected at the base, possibly even in proportions exceeding those found at SBr-895 if significant amounts of acorns were brought the short distance base to the base before being crushed.

Camps similar in function to SBr-895 should be found in comparable topographic positions at canyon mouths along the valley/foothill border. Likely candidates among recorded sites include SBr-2365 and SBr-896. If the processes responsible for the burial of the site beneath colluvium are not peculiar to SBr-895, sites of this type might not be detectable from surface remains (unless the deposit is disturbed, as was the case at SBr-895 when the power line maintenance road was put in).

The full settlement system must have included many more types of encampments: hunting blinds, kill sites, other wild plant processing stations, and sites related to lithic extraction, for example. But since none of these were targeted at resources whose harvest was so abundant or so seasonally specific, their remains will be more difficult to detect. The duration of occupation would have been more ephemeral, their location not necessarily tied to fresh water sources, and the same spots less likely to have been re-occupied. Compounding the problem of their detectability is the differential intensity of site surveys which has followed the requirements of utility right-of-ways, modern flood control, and so forth.

10.0 SUMMARY AND CONCLUSIONS

10.1 Substantive

This report has dealt with the results of an archaeological investigation, involving surface collection and excavation, of the Chaffey Hillside Site, CA-SBr-895. The total volume of the excavations amounted to 29.84 cubic meters. A total of 168 artifacts were recovered in the excavations and another 31 in the surface collection. These were all stone tools, the majority simple percussion flaked core or large flake scraping tools. Fragmented manos and metates form the bulk of the ground stone tools, but an unusually large proportion of the metates were unbroken. Chopper, cobble, and core hammerstones are also common. Present but rare items include a single fragment of a small obsidian projectile point and two small pieces of asphaltum. Four mortar and two pestle fragments are included in the collection. An additional 85 pieces of debitage were found.

Artifacts recovered from the surface were scattered over an area of about 3700 m^2. It is estimated that the original deposit covered a much smaller area of perhaps 650 to 1300 m^2, tucked up around the base of the hillside. Modern earth moving activities, acting in concert with natural downslope disaggregation of materials, have produced the dispersed surface pattern.

Locally available materials account for 89.3% of the tools, while another 5.8% are of hypabyssal rocks with a nearest known source in the hills 5 km to the west. More exotic materials, such as light colored chalcedony and obsidian, account for the final 4.9%.

Animal bone is scarce in the deposit. The bones of deer, fox, black-tailed hare, brush rabbit, ground squirrel, pocket gopher, and a snake were identified, but in such small quantities that each species could be represented by a single individual. Identified deer elements are almost entirely lower limb bones.

The deposit is stratified, with the major break between the top 30 to 50 cm (Stratum 1) covering 40 to 80 cm of cultural layers. The top stratum may be the product of any of several natural or artificial processes, but it clearly post-dates the occupation of the site.

A radiocarbon date from scattered bits of charcoal near the base of this stratum yielded a date of less than 180 B.P. (essentially modern). A second sample of charcoal from the occupational strata returned a date of A.D. 530 ± 70 in calendar years, with all corrections applied.

The hydration thicknesses of all five pieces of obsidian recovered were measured. Four of the five fell into the narrow range between 5.4 and 5.8 microns. The single outlying value of 7.1 microns was obtained from the projectile point fragment.

10.2 Interpretive

Trends in the interpretation of inter-assemblage variability in coastal southern California over the last 25 years have paralleled developments throughout the science of Archaeology. Early interpretations stressed chronological explanations. As more radiocarbon dates became available, it was evident that roughly contemporaneous deposits might contain very different assemblages.

Explanations were offered in terms of ethnic differentiation or, when the assemblages considered were more widely separated, in terms of the effects of broad-scale environmental zonation in the availability of food resources (e.g., agave/yucca, oak, shellfish).

It would be a very fortunate circumstance if all the sites considered performed identical functions in their respective settlement systems, and if the organization of these systems did not change over the time-spans considered. But what is needed for a convincing chronological framework is a perspective that focuses not on the level of the single site, but rather one that considered the integration and evolution of entire settlement systems and how these may differ by region.

Are the SBr-895 remains best viewed as belonging to the Milling Stone Horizon or to the Intermediate Cultures? Upon examination, this question proves to be more a matter of definition than of substance, and the definitions are inadequate.

It has been proposed that SBr-895 represents a specialized plant processing camp occupied by a small family group for periods of up to several weeks during the months of April, May, or June (the optimal time for yucca exploitation). Briefer visits to the site probably took place during the acorn harvest in October or November. The absence of any mortar or pestle fragments in levels below Stratum 11 opens the possibility that acorn exploitation was a later addition to the site's function, superimposed on the original yucca focus.

Both the thickness of the strata bearing cultural materials and the range of obsidian hydration measurements hint that the span of re-occupation of the site may have extended over several hundred years. The deposit beneath the overburden stratum is thicker than any of the deposits of the four sites used for comparison. It should be noted however, that two obsidian samples separated by at least 50 cm of depth in Excavation Unit #5 differ by only 0.1 micron in their hydration measurements. The location of the deposit, up against the base of a steep hill, may mean that colluviation was a more important factor in the formation of SBr-895 than it was for the other sites. No neat sterile strata separating the larger artifact bearing levels were discerned however. The location of refuse producing activities remained tightly focused over whatever span is represented.

It is further hypothesized that the people that created SBr-895 were based at a larger settlement near Red Hill, 5 km to the southwest. A central-based wandering pattern of settlement, with at least one focus on the area that came to be known as the Cucamonga "rancheria", prevailed in the Pomona Valley at least 1300 years before missionization.

What of the dynamics of settlement system evolution? If the Gabrielino and their neighbors followed a central-based seasonal round at the time of missionization, was there an earlier time when there were no central bases? As has been noted, the addition of acorn products to the aboriginal diet introduced incentives encouraging trends toward sedentism. But milling stone assemblages often characterize very extensive deposits leading, for example, to Wallace's suggestion that coastal examples reflect the remains of groups that were "more or less sedentary" (1955:219). If so, central bases must have been very different places before and after the introduction of acorn exploitation.

The settlement system proposed for the context of SBr-895 is undoubtedly oversimplified. But our ignorance of the full complexity of the situation should not prevent us from making any inferences at all, especially if those we make are testable.

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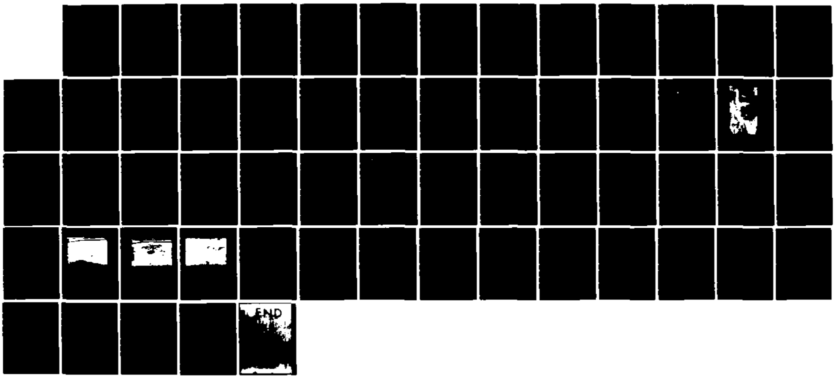
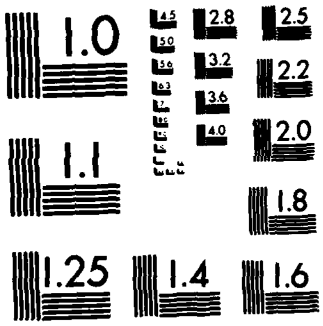
APPENDIX A

Transit Reading Conversions

AD-A144 331 THE CHAFFEY HILLSIDE SITE CA-SBR-895; REPORT OF THE CULTURAL RESOURCE MIT..(U) ARCHAEOLOGICAL RESOURCE MANAGEMENT CORP GARDEN GROVE CA L P ALLEN JAN 82 2/2

UNCLASSIFIED DACW09-81-C-0016 F/G 5/6 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

TRANSIT READING CONVERSIONS

CA-SBR-893 READINGS OF 1/21/81

SLOPE HEIGHT = 5.68 FEET (1.73 METERS)

DATUM ELEVATION = 2233.03 FEET (680.63 METERS) ABOVE SEA LEVEL

ANGLES ARE EXPRESSED EAST OF TRUE NORTH

DISTANCE AND X AND Y COORDINATES EXPRESSED IN FEET

ELEVATIONS EXPRESSED RELATIVE TO SEA LEVEL

POINT #	LABEL	ANGLE	DISTANCE	X COORD	Y COORD	ELEV(FT)	ELEV(M)
1	POWER TOWER S LEG	71.2	112	106.02	36.12	2235	681.23
2	SURFACE #1	86.4	37	36.72	2.46	2232.46	680.45
3	SURFACE #2	70.5	24	22.62	8.02	2234.14	680.97
4	SURFACE #3	47.1	28	20.51	19.06	2236.01	681.54
5	SURFACE #4	32.6	26	14.01	21.91	2236.33	681.63
6	SURFACE #5	29.5	25.5	12.55	22.2	2235.94	681.51
7	SURFACE #6	40.1	34	21.9	26.01	2237.28	681.92
8	SURFACE #7	42.5	34	22.97	25.07	[illegible]	[illegible]
9	SURFACE #8	56.6	40	33.37	22.03	2236.91	681.81
10	SURFACE #9	35.4	47.73	28.92	40.7	2239.82	682.7
11	SURFACE #10	23.7	46.74	18.86	42.78	2240.33	682.85
12	SURFACE #11	22.6	85.53	32.86	78.96	2245.21	684.34
13	SURFACE #12	72	113	107.46	34.94	2234.93	681.21
14	SURFACE #13	95.4	137.78	137.28	-14.06	2226.95	678.77
15	SURFACE #14	112.7	66.77	61.6	25.85	2227.86	679.05
16	SURFACE #15	113.5	71.99	66.02	28.7	2227.93	679.07
17	SURFACE #16 & #17	127.6	69.88	55.35	42.6	2225.38	678.27
18	SURFACE #18	129.5	83.53	66	54.4	2221.03	676.97
19	SURFACE #19	137.8	74.59	48.15	56.76	2222.64	677.46
20	SURFACE #20	148.5	76.58	42.28	-65.85	2222.01	677.27
21	SURFACE #21	142.3	65.64	40.15	51.93	2225.27	678.26
22	SURFACE #22	150.3	70.11	35.34	63.72	2218.95	676.34
23	SURFACE #23	177.8	138.64	.52	138.64	2212.52	674.38
24	SURFACE #24	178.4	121.8	34.38	118.85	2218.92	676.33
25	SURFACE #25	209	151.88	73.61	-132.83	2215.04	675.14
26	SURFACE #26	209.8	234.24	-116.37	-203.28	2205.62	672.27
27	SURFACE #27	81	13	12.84	2.04	2231.6	680.17
28	SURFACE #28 & #29	261	20	-19.75	3.13	2229.36	679.51

TRANSIT READING CONVERSIONS

CA-SDR-875 READINGS OF 1/22/81

SCOPE HEIGHT = 5.41 FEET (1.65 METERS)

DATUM ELEVATION = 2233.03 FEET (680.63 METERS) ABOVE SEA LEVEL

ANGLES ARE EXPRESSED EAST OF TRUE NORTH

DISTANCE AND X AND Y COORDINATES EXPRESSED IN FEET

ELEVATIONS EXPRESSED RELATIVE TO SEA LEVEL

POINT #	LABEL	ANGLE	DISTANCE	X COORD	Y COORD	ELEV(FT)	ELEV(M)
1	EU #5 SW CORNER	73.2	49	46.91	14.17	2235.42	681.36
2	EU #5 NE CORNER	70	58	54.5	19.85	2236.13	681.57
3	EU #6 SW CORNER	58.7	57.96	47.52	38.12	2237.91	682.11
4	EU #6 NE CORNER	58.6	68.96	58.85	35.74	2238.95	682.43
5	SURVEY POINT	191.3	22	4.31	21.57	2229.72	679.62
6	TALL METAL STAKE	199	22	-7.16	20.8	2230.33	679.8
7	WOOD STAKES	204.5	17	-7.05	15.47	2231.24	680.08
8	CVV N CORNER	19[illegible].1	[illegible]0.77	-12.7[illegible]	[illegible]	222[illegible].9[illegible]	678.18
9	CVV S CORNER	193.9	73.72	-17.71	-71.56	2224.07	678.15
10	TALL METAL STAKE	214.3	195.53	-110.17	-161.54	2207.97	673.6
11	ELECTRIC BOX	206.4	231.72	-103.01	-207.56	2205.53	672.25

TRANSIT READING CONVERSIONS

CA-SBR-095 READINGS OF 1/26/81

SCOPE HEIGHT = 5.22 FEET (1.59 METERS)

DATUM ELEVATION = 2233.03 FEET (680.63 METERS) ABOVE SEA LEVEL

DISTANCE AND X AND Y COORDINATES EXPRESSED IN FEET

ELEVATIONS EXPRESSED RELATIVE TO SEA LEVEL

POINT #	LABEL	ANGLE	DISTANCE	X COORD	Y COORD	ELEV(FT)	ELEV(M)
1	SURFACE #30	77.2	153	149.19	33.73	2236.33	681.63
2	7 CM PIPE	27.9	48.88	22.87	43.2	2237.9	682.72
3	DITTO 1	46.8	51.07	37.01	35.51	2237.36	682.56
4	DITTO 2	58.3	57.86	49.22	30.41	2238.02	682.15
5	DITTO 3	62.1	64.84	57.3	30.35	2238.03	682.16
6	22 CM PIPE E WALL	59.3	67.83	58.32	34.64	2238.69	682.35
7	22 CM PIPE W WALL	56.4	60.85	50.68	33.68	2238.61	682.33
8	CUT TOP	41.4	69.73	46.11	52.31	2242.76	683.65
9	DITTO 1	31.8	78.23	41.22	66.49	2246.74	684.81
10	DITTO 2	25	89.12	37.66	80.77	2248.66	685.4
11	DITTO 3	20.1	100.02	34.37	93.93	2250.1	685.83
12	DITTO 4	18.7	112.87	36.17	106.93	2251.14	686.15
13	DITTO 5	17.4	121.8	36.42	116.23	2251.06	686.12
14	DITTO 6	16.6	134.68	38.47	129.07	2251.42	686.23
15	CUT W EDGE	12.1	82.55	17.3	80.72	2244.17	684.02
16	DITTO 1	13.8	71.61	17.08	69.54	2243.46	683.81
17	DITTO 2	18.4	58.68	18.52	55.68	2241.88	683.33
18	DITTO 3	32.2	52.71	28.08	44.61	2240.58	682.72
19	7 CM PIPE	5.8	77.56	8.04	77.15	2241.01	683.06
20	7 CM PIPE	12.3	58.68	12.5	57.33	2240.1	682.78

TRANSIT READING CONVERSIONS

CA-SBR-895 READINGS OF 1/30/81

SCOPE HEIGHT = 5.38 FEET (1.64 METERS)

DATUM ELEVATION = 2233.03 FEET (680.63 METERS) ABOVE SEA LEVEL

DISTANCE AND X AND Y COORDINATES EXPRESSED IN FEET

ELEVATIONS EXPRESSED RELATIVE TO SEA LEVEL

POINT #	LABEL	ANGLE	DISTANCE	X COORD	Y COORD	ELEV(FT)	ELEV(M)
1	EU#7 SW CORNER	61	36	31.48	17.46	2235.85	681.49
2	EU #7 NE CORNER	60.2	44	38.18	21.07	2236.79	681.77
3	EU #8 SW CORNER	250.9	18	-17.01	-5.89	2231.96	680.3
4	EU #8 NE CORNER	261.9	11	-10.87	-1.55	2232.86	680.58

TRANSIT READING CONVERSIONS

CA-SBR-895 READINGS OF 2/2/81

SCOPE HEIGHT = 5.51 FEET (1.68 METERS)

DATUM ELEVATION = 2233.03 FEET (680.63 METERS) ABOVE SEA LEVEL

DISTANCE AND X AND Y COORDINATES EXPRESSED IN FEET

ELEVATIONS EXPRESSED RELATIVE TO SEA LEVEL

POINT #	LABEL	ANGLE	DISTANCE	X COORD	Y COORD	ELEV(FT)	ELEV(M)
1	EU #1 SW APPROX	19.4	37	12.29	34.9	2237.6	682.02
2	EU #1 NE APPROX	28.2	40.98	19.36	36.12	2238.62	682.33
3	EU #2 SW APPROX	34.3	49.77	28.15	41.28	2239.76	682.68
4	EU #2 NE APPROX	40.4	54.92	35.59	41.83	2240.47	682.9
5	UP HILL	37.6	77.02	48.21	62.61	2247.75	685.18
6	DITTO 1	37.1	88.63	53.45	70.7	2252.57	686.58
7	DITTO 2	37.4	103.28	62.72	82.05	2259.46	688.68
8	DITTO 3	36.6	124	73.92	99.56	2269.84	691.85
9	DITTO 4	35.7	159.27	92.73	129.35	2284.73	696.45
10	DITTO 5	34.7	198.2	112.81	162.96	2301.65	701.54
11	DITTO 6	35.9	199.73	117.1	161.8	2299.87	701
12	DISTURBED	42.5	81.2	54.85	59.87	2247.3	684.98
13	DITTO 1	53.9	86.15	69.6	50.77	2243.75	683.87
14	DITTO 2	65.2	90.65	82.28	38.04	2238.98	682.44
15	DITTO 3	76.8	111	108.06	25.37	2233.56	680.79
16	DITTO 4	65	171.76	155.65	72.62	2243.26	683.75
17	DITTO 5	58.9	171.35	146.7	88.54	2249.68	685.7
18	DITTO 6	51.4	172.31	134.65	107.52	2260.97	689.14
19	SURFACE #01	39.9	15	9.62	11.51	2234.47	681.07
20	UPPER EDGE CUT	93.8	48	47.89	-3.18	2230.73	679.93
21	DITTO 1	88.9	39	38.94	2.12	2232.37	680.43
22	DITTO 2	80.4	25	24.65	4.18	2233.18	680.67
23	DITTO 3	54.7	15	12.24	8.67	2233.89	680.89
24	DITTO 4	138.3	18	12.44	-13.01	2229.81	679.65
25	DITTO 5	127.4	23	18.27	-13.97	2227.5	679.55
26	DITTO 6	128.8	34.66	27.76	-20.76	2228.7	679.31
27	DITTO 7	145.1	25	14.31	20.5	2229.44	679.53
28	DITTO 8	162.2	26	7.93	24.75	2228.7	679.37
29	DITTO 9	166	27.96	7.28	27.07	2227.27	678.87

TRANSIT READING CONVERSIONS

CA-SBR-895 READINGS OF 2/3/81

SCOPE HEIGHT = 5.46 FEET (1.66 METERS)

DATUM ELEVATION = 2233.03 FEET (680.63 METERS) ABOVE SEA LEVEL

DISTANCE AND X AND Y COORDINATES EXPRESSED IN FEET

ELEVATIONS EXPRESSED RELATIVE TO SEA LEVEL

POINT #	LABEL	ANGLE	DISTANCE	X COORD	Y COORD	ELEV(FT)	ELEV(M)
1	EU #9 SW CORNER	59.5	48	41.35	24.37	2236.99	681.83
2	EU #9 NE CORNER	58.8	57	48.75	29.54	2237.55	682.01
3	EU #10 SW CORNER	217.8	76.76	-61.73	-74.35	2222.97	677.57
4	EU #10 NE CORNER	217.5	87.77	-53.43	-67.66	2224.37	677.97
5	PIPELINE	96.7	76	75.48	-8.87	2227.45	677.54
6	PIPELINE	127.8	48.93	37.6	-31.32	2226.07	678.51
7	ENTERING VAULT	187.6	64.84	-10.81	63.73	2225.26	678.26
8	EXITING VAULT	196.1	70.83	-19.64	68.05	2224.75	678.16
9	CONTINUING	213	109.4	-59.57	-71.76	2220.14	676.7
10	PIPE TURNS SOUTH	221.3	158.13	-104.35	-118.81	2215.53	675.23
11	DITTO	218.1	174.04	-107.37	136.77	2212.85	674.48
12	PIPE SPLITS	214.3	191.94	-108.15	-158.57	2210.2	673.67

TRANSIT READING CONVERSIONS

CA-SBR-895 READINGS OF 2/12/81

SCOPE HEIGHT = 5.25 FEET (1.6 METERS)

DATUM ELEVATION = 2233.03 FEET (680.63 METERS) ABOVE SEA LEVEL

DISTANCE AND X AND Y COORDINATES EXPRESSED IN FEET

ELEVATIONS EXPRESSED RELATIVE TO SEA LEVEL

POINT #	LABEL	ANGLE	DISTANCE	X COORD	Y COORD	ELEV(FT)	ELEV(M)
1	EU #11 SW CORNER	69.4	60	56.16	21.12	2236.2	681.59
2	EU #11 NE CORNER	67.9	71	65.78	26.73	2236.8	681.78
3	SURF SOIL SAMP #1	64.9	87.95	79.64	37.33	2238.85	682.4
4	SURF SOIL SAMP #2	175.4	100.45	8.06	-100.12	2219.31	676.45
5	DISTURBED-LOW	78.4	37	36.6	5.4	2227.87	677.66
6	DITTO 1	77.8	27	26.75	3.66	2230.14	677.75
7	DITTO 2	97.3	13	12.87	1.7	2230.7	677.78
8	DITTO 3	121.3	27	24.73	-15.15	2227.17	677.45
9	BASE OF CUT	25.1	78.57	33.32	71.15	2244.81	683.77
10	DITTO 2	18.1	87.51	27.6	83.06	2244.97	684.27
11	DITTO 2	15.4	105.42	27.99	101.64	2245.81	684.52
12	SURFACE #32	74.2	162.78	156.61	44.41	2237.7	682.05
13	SURFACE #33	97.2	90	89.29	-11.28	2229.93	679.68
14	SURFACE #34	108	88.88	84.53	27.46	2225.67	678.38
15	EXPLR TRENCH NE	163.7	50.01	14.27	48.76	2224.75	678.1
16	EXPLR TRENCH SW	164.1	56.78	15.57	54.6	2224.82	678.13

APPENDIX B

Catalog Sorted By Provenience

EU	LVL	DESCRIPTION	W/F	WEIGHT	LENGTH	WIDTH	DEPTH	MATERIAL	COMMENT	ACC#
0	1	MANO/B	F					GRDR	20%	8787
0	2	RET FL/U-SER-5	W	43.15	5.47	4.78	1.62	CRML		8788
0	3	MANO/U	W	879.63	12.50	10.10	4.62	GN		8789
0	5	RET FL/U-CC-4	W	255.93	8.20	7.53	3.00	CRML	UT FL/U-S-4	8791
0	5	UT FL/U-S-4	W	255.93	8.20	7.53	3.00	CRML	RET FL/U-CC-4	8791
0	7	UT FL/U-S-1	W	1.36	2.68	1.77	0.32	FELS		8793
0	9	SCR/P/2C	W	878.80	8.58	6.64	6.50	GN?		8794
0	10	NET	F					BRT		8795
0	11	RET FL/U-CC-5	W	197.54	9.53	6.87	2.58	QZT		8796
0	12	HAM/COB	W	454.00	7.50	7.15	5.94	MBST		8797
0	13	SCR/CL	W	1048.90	15.80	12.00	6.25	BRT		8798
0	14	RET FL/U-CV-5	W	258.77	8.06	7.80	3.09	MTSD		8799
0	15	UT FL/U-CV-5	W	93.20	6.47	5.63	2.05	CRML		8800
0	16	SCR/SE	W	177.68	10.64	5.20	2.16	CRML		8801
0	17	SCR/CE	F					MTSD		8802
0	18	HAM/CH	W	368.88	9.25	6.60	5.27	CRML		8803
0	18	NET	F					GN		8804
0	19	HAM/CORE	W	595.88	8.95	7.07	7.02	CRML		8805
0	20	DISH	F					MTSD		8806
0	21	SCR/P/2A	W	368.50	7.36	7.27	4.94	MBST		8807
0	22	HAM/COB/P	W	368.88	9.50	5.32	4.34	CRMT		8808
0	23	RET FL/U-CV-4	W	45.64	5.81	4.62	1.60	CRML		8809
0	24	SCR/P/2C	W	680.40	9.14	6.62	6.68	MTSD		8810
0	25	UT FL/U-S-5	W	41.48	6.60	3.40	1.75	MBST		8811
0	26	SCR/CE	W	50.05	4.82	4.55	1.98	CRML		8812
0	27	RET FL/U-S-4	W	107.20	7.06	5.47	1.92	CRML		8813
0	28	SCR/CE	W	297.22	8.74	6.90	3.84	GN		8814
0	30	HAM/CH	W	652.63	9.00	8.02	7.00	CRML		8612
0	31	SCR/P/3	W	1106.63	11.17	10.97	6.59	CRML		8613
0	32	PESTLE	F					SBSTA		8614
0	33	MORTAR	F					VCFC	SHAPED BASE	8615
0	34	HAM/CH	W	340.00	7.28	5.57	4.80	CRML	SCR/P/2A	8616
0	34	SCR/P/2A	W	340.00	7.28	5.57	4.80	CRML	HAM/CH	8616
5	2	UT FL/U-CV-5	W	15.11	4.21	3.21	1.14	MBST		8718
5	3	UT FL/B-S-3	W	10.20	4.05	2.88	0.99	FELS		8720
5	3	UT FL/U-CV-3	W	0.19	1.23	0.93	0.18	OBS		8719
5	3	UT FL/U-S-3	W	7.75	3.22	2.45	1.25	CRML		8721
5	3	UT FL/U-S-4	W	17.96	5.33	3.48	0.84	GN		8722
5	4	HAM/CH	W	396.90	10.21	9.93	3.78	CAT		8737
5	4	HAM/CORE	W	624.25	9.78	8.67	5.73	CRML		8738
5	4	MANO/B/ES	F					BRT	30%	8735
5	4	MANO/B/ES	W	681.00	9.85	9.67	4.15	GRDR		8734
5	4	MANO/U	F					CAT	30%	8724
5	4	MANO/U?	F					GNG	<10%	8725
5	4	NET	F					SCH		8736
5	4	MORTAR/BOWL	F					SBSTA	RIM	8739
5	4	RET FL/B-CV-4	W	55.30	6.66	4.39	1.64	MTSD		8732
5	4	RET FL/U-CC-5	W	62.24	5.12	3.91	2.87	MBST		8726
5	4	RET FL/U-CV-5	F					CHALC		8723
5	4	RET FL/U-S-4	W	167.19	8.68	6.15	2.98	CRML	RET FL/U-S-5	8730
5	4	RET FL/U-S-5	W	167.19	8.68	6.15	2.98	CRML	RET FL/U-S-4	8730
5	4	SCR/SE	W	81.60	7.42	4.23	3.02	MTSD		8727
5	4	UT FL/B-S-3	W	157.81	9.33	6.32	2.85	QZT		8729
5	4	UT FL/U-CV-3	W	112.39	6.86	6.20	2.90	QZT		8728
5	4	UT FL/U-CV-3	W	63.71	5.51	5.04	1.97	QZT		8731
5	4	UT FL/U-CV-2	F					MBST		8733
5	5	MANO/B	F					BRT	30%	8740
5	5	MANO/B/ES	F					BRT	20%,WEDGE-SHAPED	8741

EU	LVL	DESCRIPTION	W/F	WEIGHT	LENGTH	WIDTH	DEPTH	MATERIAL	COMMENT	ACC#
5	5	PAINT ROCK	W	9.10	2.69	1.97	1.15	CH		8743
5	5	SCR/P/3	W	293.68	8.59	7.64	4.25	CRNL		8742
5	6	HAM/CH	W	425.63	8.10	5.35	5.04	CRNL		8748
5	6	HAM/CORE	W	709.38	9.10	7.06	6.80	FELS		8747
5	6	MANO/B/ES	F					BRT	30%	8746
5	6	MET	F					CAT		8745
5	6	MET	F					CH		8744
5	6	UT FL/U-S-5	W	204.38	7.91	7.60	3.55	QZT		8749
5	7	MANO/B/ES	F					BRT	20%	8751
5	7	MET	F					CRNT		8750
5	7	RET FL/U-SER-5	W	78.08	7.58	5.98	2.27	CRNL		8757
5	7	SCR/P/2A	W	249.42	7.66	6.48	3.29	MTSD		8753
5	7	SCR/P/2B	W	595.30	11.32	8.65	5.28	QZT		8754
5	7	SCR/P/3	W	368.50	8.79	8.58	3.78	CRNL		8752
5	7	SCR/SE	W	453.60	12.70	6.68	5.43	CRNL		8755
5	7	UT FL/U-CV-5	W	115.19	8.57	5.95	2.76	CRNL		8756
5	7	UT FL/U-S-2	W	3.41	3.75	2.71	0.49	QZT		8758
5	7	UT FL/U-S-4	W	42.35	7.34	4.62	1.32	CRNL		8759
5	8	HAM/COB	W	567.50	8.69	6.17	6.25	CAT		8763
5	8	MANO/B	F					CRNT?	30%	8762
5	8	MANO/B/ES	F					GRDR	40%	8760
5	8	MANO/U	F					BRT	20%	8761
5	8	SCR/P/2C	W	538.60	11.05	9.10	3.64	CRNL		8764
5	8	UT FL/U-CV-3	W	13.10	6.15	2.93	0.79	CRNL		8765
5	8	UT FL/U-S-5	W	34.52	6.49	3.53	1.55	CRNL		8766
5	9	HAM/COB	W	766.13	10.00	8.41	6.75	CAT		8767
5	9	MANO/U?	F					BRT	10%	8768
5	9	RET FL/B-S-4	F					OBS		8821
5	9	SCR/CE	W	301.56	8.05	8.56	4.42	CRNL		8769
5	9	UT FL/U-CV-3	W	8.16	3.25	3.18	0.96	FELS		8771
5	9	UT FL/U-S-3	W	16.87	4.37	3.40	1.05	CRNL		8770
5	10	RET FL/U-CV-3	W	49.45	6.22	5.58	1.32	CRNL	UT FL/B-S-3	8772
5	10	UT FL/B-S-3	W	49.45	6.22	5.58	1.32	CRNL	RET FL/U-CV-3	8772
5	10	UT FL/U-S-3	W	8.48	4.19	1.63	1.10	QZT		8773
6	7	MET	F					CRNL		8774
6	7	SCR/CE	W	185.61	8.44	7.79	3.72	CRNL		8775
6	8	MANO/U	F					CH	60%	8776
6	8	UT FL/U-S-3	W	1.95	2.63	1.50	0.64	QZT		8777
6	9	UT FL/B-CV-5	F					MTSD		8779
6	9	UT FL/U-S-5	W	147.11	7.35	7.50	2.10	CRNL		8778
6	10	MET/BASIN	W	26036.2	43.00	33.00	11.00	CAT	BASIN 1.5 CM DEEP, BLACK STAIN	8820
6	10	UT FL/U-S-5	F					QZN		8780
6	11	MANO/U	F					CAT	60%	8781
6	11	SCR/P/2B	W	233.38	7.54	4.45	3.20	CH		8782
6	11	UT FL/U-S-4	W	12.61	3.17	3.04	1.20	MBST		8783
6	12	UT FL/U-CV-5	W	46.74	8.23	3.71	1.68	MTSD		8784
6	12	UT FL/U-S-2	F					MBST		8790
6	12	UT FL/U-S-3	W	2.37	2.53	1.93	0.58	MBST		8785
7	1	UT FL/U-S-4	W	28.85	4.78	4.22	3.52	MBST		8617
7	3	UT FL/B-CV-4	W	5.02	4.98	1.30	0.89	RHY		8618
7	3	UT FL/U-S-2	W	68.68	8.32	4.51	1.73	CRNL		8619
7	5	MANO/B/ES	F					BRT	30%	8620
7	5	RET FL/B-CV-4	F					MTSD		8621
7	5	UT FL/U-S-3	W	2[illegible].37	4.68	4.08	1.37	CRNL		8622
7	6	MANO/U	W	482.38	12.40	8.64	4.30	BRT		8623
7	6	PESTLE	F					CNC		8624
7	6	RET FL/U-S-4	W	114.01	9.64	5.73	2.37	CRNL		8628
7	6	SCR/CE	W	296.61	8.70	7.20	5.81	CRNL		8626

EU	LVL	DESCRIPTION	W/F	WEIGHT	LENGTH	WIDTH	DEPTH	MATERIAL	COMMENT	ACC#
7	6	SCR/P/3	W	425.20	10.09	8.80	4.28	GRNL	BLACK STAIN	8627
7	6	SCR/SE	W	161.42	10.03	6.85	2.66	MTSD?	BLACK STAIN	8629
7	6	UT FL/B-CC-3	W	197.94	9.54	6.06	2.67	GRNL		8663
7	7	RET FL/B-S-4	W	137.43	10.69	5.66	2.33	GRNL		8630
7	8	MANO/B	F					BRT	20%	8631
7	8	SCR/SE	W	154.43	8.08	5.26	3.68	CAT		8632
7	10	SPHERE	W	482.38	7.54	6.97	6.40	GRNT		8633
7	11	POINT/SMALL?	F					OBS	TIP	8634
7	12	UT FL/U-CC-5	W	6.89	3.53	2.27	1.00	CHALC		8635
8	1	SCR/SE	W	283.50	9.07	7.34	4.17	GRNL		8636
8	2	CORE	W	96.42	5.57	4.71	3.94	FELS		8638
8	2	MANO/B	F					BRT	80%	8637
8	2	UT FL/U-CV-2	W	14.33	3.40	2.57	1.28	FELS		8639
8	3	MANO/U?	F					GRNT	30%	8640
8	3	RET FL/B-S-5	W	184.75	8.48	7.03	5.61	GRNL		8641
8	3	UT FL/U-CC-4	W	42.45	6.83	3.17	2.35	GRNL		8642
8	4	HAM/CH	W	265.53	8.25	5.91	5.11	GRNL		8648
8	4	HAM/COB	W	144.48	7.23	6.00	2.28	CAT	FLAT	8647
8	4	MANO/B	F					BRT	50%	8644
8	4	MANO/U	F					BRT	70%	8643
8	4	MANO/U?	F					ANDV	10%	8646
8	4	MORTAR	F					AND	GROUND BASE	8645
8	4	SCR/CE	W	239.68	8.37	6.94	4.71	GRNL		8649
8	4	SCR/CE	W	263.51	8.01	4.96	4.70	GN		8650
8	4	SCR/CE	F					GRNL		8651
8	4	UT FL/B-S-1	W	41.75	7.33	4.48	1.31	MBST		8652
8	4	UT FL/U-S-3	W	20.83	4.27	3.95	0.97	MBST		8653
8	5	RET FL/U-CV-5	W	191.35	9.27	5.34	4.68	GRNL		8655
8	5	SCR/P/2B	W	595.30	10.95	8.56	4.82	GRNT		8654
8	6	RET FL/B-S-4	W	3.31	2.97	1.71	0.60	OBS	USED ON 4 EDGES	8656
9	1	RET FL/U-CV-4	W	23.22	4.20	3.55	1.48	GRNL		8657
9	2	SCR/CE	W	197.26	7.93	4.62	4.20	MBST		8660
9	2	UT FL/U-S-3	W	9.72	4.30	2.64	1.03	GRNL		8661
9	2	UT FL/U-S-4	W	23.44	4.87	3.43	1.32	QZT		8659
9	2	UT FL/U-S-5	W	19.71	5.05	1.17	1.08	MBST		8658
9	5	DEB	W	0.47	1.96	0.69	0.44	OBS		8662
9	7	MANO/U?	F					BRT	20%	8664
9	7	SCR/P/2A	W	204.14	8.36	6.62	3.12	GRNL		8666
9	7	SCR/P/2B	W	228.83	8.07	6.87	3.13	CAT	BLACK STAIN	8665
9	8	HAM/CH	W	295.99	7.00	6.04	5.63	GRNL	SCR/P/2A	8669
9	8	MANO/U	F					GRDR	30%	8668
9	8	MORTAR	F					GRNT	SHAPED BASE, BURNT	8667
9	8	SCR/P/3	W	266.45	7.93	7.31	4.14	GRNL		8670
9	8	SCR/P/2A	W	295.99	7.00	6.04	5.63	GRNL	HAM/CH	8669
9	8	SCR/P/2B	W	221.01	8.12	6.14	3.67	MTSD		8671
9	9	HAM/CH	W	652.00	10.30	8.37	6.14	CAT		8673
9	9	MANO/U	W	1021.50	13.60	9.63	6.12	GNE		8672
9	9	MANUPORT	W	71.21	6.26	5.52	3.25	SCO		8677
9	9	SCR/P/2C	W	226.75	8.91	5.37	3.55	MTSD		8674
9	9	SCR/P/3	W	368.50	7.08	6.49	5.15	GRNL		8675
9	9	UT FL/B-S-3	W	162.43	9.48	8.36	2.94	GRNL		8676
9	10	HAM/COB/P	F					SCH		8679
9	10	UT FL/B-P-3	F					CHALC		8678
9	11	HAM/CH	W	397.25	8.15	6.20	4.91	GNE		8680
9	11	SCR/P/2B	W	147.92	6.32	5.73	3.58	MTSD		8681
9	12	MANO/U?	F					BRT	10%	8682
9	12	MET	F					GNE		8684
9	12	SCR/P/2A	W	177.54	6.19	6.30	3.55	GRNL		8683

EU	LVL	DESCRIPTION	W/F	WEIGHT	LENGTH	WIDTH	DEPTH	MATERIAL	COMMENT	ACC#
9	12	UT FL/U-S-2	W	8.18	3.96	2.51	0.90	CRNL		8685
10	2	NET	F					DRT		8686
10	2	PAINT ROCK (RED)	W	181.73	9.18	4.73	4.01	MTSD		8687
10	2	PAINT ROCK (RED)	W	132.54	6.30	3.70	3.28	MTSD		8688
10	5	ASPHALTUM	F					ASPH	2 SMALL FLAT PIECES	8689
10	5	RET FL/U-CV-5	W	5.46	2.93	1.89	1.44	MTV		8690
10	5	UT FL/U-CV-2	W	74.01	5.80	5.27	2.50	CRNL		8822
10	6	SCR/CE	W	120.00	7.11	4.90	3.60	CRNL		8691
11	1	SCR/P/2C	W	261.15	10.54	5.58	3.94	MTSD		8692
11	2	SCR/CE	W	59.57	6.91	3.92	2.56	CRNL		8693
11	3	SCR/CE	W	57.76	5.65	4.88	2.27	CAT		8694
11	3	UT FL/U-S-3	W	6.16	3.56	1.85	0.80	QZN		8695
11	4	UT FL/U-S-4	W	1.94	3.05	1.28	0.50	MTV		8696
11	5	MET/BASIN	W	25945.0	48.00	27.00	15.00	GNG	BASIN 5 CM DEEP, BLACK STAIN	8816
11	6	HAM/CH	F					CRNL		8700
11	6	MANO/U	W	964.75	10.48	8.87	6.63	CAT		8698
11	6	NET	F					GN		8697
11	6	RET FL/U-CV-5	W	159.63	8.05	6.45	3.00	CRNL		8701
11	6	SCR/P/2A	W	396.68	9.11	7.87	4.24	GNG		8699
11	7	CORE	W	32.17	4.76	2.71	2.45	CHALC		8703
11	7	MANO/U	F					GRNT	20%	8702
11	7	PAINT ROCK?	W	1020.00	12.00	11.00	5.75	SKARN		8815
11	7	RET FL/B-CV-5	F					CHALC		8704
11	7	SCR/SE	W	311.80	8.68	7.16	3.76	MTSD		8706
11	7	UT FL/U-CC-4	W	196.28	10.17	6.84	2.87	CRNL	UT FL/U-S-4	8707
11	7	UT FL/U-CV-3	W	89.43	8.04	5.54	2.70	GNG		8705
11	7	UT FL/U-S-4	W	196.28	10.17	6.84	2.87	CRNL	UT FL/U-CC-4	8707
11	8	HAM/COB	F					CAT	MANO/U	8708
11	8	MANO/U	F					CAT	60%, HAM/COB	8708
11	8	MET/SLAB	W	5675.00	27.00	25.00	5.00	BRT	BLACK STAIN	8817
11	8	SCR/P/2B	W	425.20	10.20	7.16	4.90	CRNL		8710
11	8	SCR/P/2B	W	198.40	7.51	5.98	5.58	QZT		8711
11	9	UT FL/U-CV-3	W	44.59	6.02	4.84	1.53	CRNL		8712
11	11	MET/SLAB	W	44542.8	49.00	45.00	13.00	BRT	BLACK STAIN	8818
11	11	PAINT ROCK?	W	567.00	10.13	8.71	4.58	SKARN	HAND SHAPED	8713
11	11	SCR/P/2B	W	340.20	9.48	6.99	3.92	CRNL		8715
11	11	SCR/SE	W	510.30	10.32	9.17	3.70	MTSD		8714
11	11	UT FL/B-S-5	W	3.82	2.71	1.58	0.70	CHALC		8716
11	11	UT FL/U-CV-3	W	17.52	4.76	3.91	1.35	CRNL		8717
11	12	MET/SLAB	W	9534.00	28.00	31.00	6.00	CAT		8819

APPENDIX C

Catalog Sorted by Material

MATERIAL	DESCRIPTION	EU	LVL	W/F	WEIGHT	LENGTH	WIDTH	DEPTH	COMMENT	ACC#
AND	MORTAR	8	4	F					GROUND BASE	8645
ANDV	MANO/U?	8	4	F					10%	8646
ASPH	ASPHALTUM	10	5	F					2 SMALL FLAT PIECES	8689
CAT	HMM/CH	5	4	W	396.90	10.21	9.93	3.78		8737
CAT	HMM/CH	9	9	W	652.00	10.30	8.37	6.14		8673
CAT	HMM/COB	5	8	W	567.50	8.69	6.17	6.25		8763
CAT	HMM/COB	5	9	W	766.13	10.00	8.41	6.75		8767
CAT	HMM/COB	8	4	W	144.48	7.23	6.00	2.28	FLAT	8647
CAT	HMM/COB	11	8	F					MANO/U	8708
CAT	MANO/U	5	4	F					30%	8724
CAT	MANO/U	6	11	F					60%	8781
CAT	MANO/U	11	6	W	964.75	10.48	8.87	6.63		8698
CAT	MANO/U	11	8	F					60%, HAM/COB	8708
CAT	MET	5	6	F						8745
CAT	MET/BASIN	6	10	W	26036.2	43.00	33.00	11.00	BASIN 1.5 CM DEEP, BLACK STAIN	8820
CAT	MET/SLAB	11	12	W	9534.00	28.00	31.00	6.00		8819
CAT	SCR/CE	11	3	W	57.76	5.65	4.88	2.27		8694
CAT	SCR/P/2B	9	7	W	228.83	8.07	6.87	3.13	BLACK STAIN	8665
CAT	SCR/SE	7	8	W	154.43	8.08	5.26	3.68		8632
CHALC	CORE	11	7	W	32.17	4.76	2.71	2.45		8703
CHALC	RET FL/B-CV-5	11	7	F						8704
CHALC	RET FL/U-CV-5	5	4	F						8723
CHALC	UT FL/B-P-3	9	10	F						8678
CHALC	UT FL/B-S-5	11	11	W	3.82	2.71	1.58	0.70		8716
CHALC	UT FL/U-CC-5	7	12	W	6.89	3.53	2.27	1.00		8635
DRT	MANO/B	5	5	F					30%	8740
DRT	MANO/B	7	8	F					20%	8631
DRT	MANO/B	8	2	F					80%	8637
DRT	MANO/B	8	4	F					50%	8644
DRT	MANO/B/ES	5	4	F					30%	8735
DRT	MANO/B/ES	5	5	F					20%, WEDGE-SHAPED	8741
DRT	MANO/B/ES	5	6	F					30%	8746
DRT	MANO/B/ES	5	7	F					20%	8751
DRT	MANO/B/ES	7	5	F					30%	8620
DRT	MANO/U	5	8	F					20%	8761
DRT	MANO/U	7	6	W	482.38	12.40	8.64	4.30		8623
DRT	MANO/U	8	4	F					70%	8643
DRT	MANO/U?	5	9	F					10%	8768
DRT	MANO/U?	9	7	F					20%	8664
DRT	MANO/U?	9	12	F					10%	8682
DRT	MET	0	10	F						8795
DRT	MET	10	2	F						8686
DRT	MET/SLAB	11	8	W	5675.00	27.00	25.00	5.00	BLACK STAIN	8817
DRT	MET/SLAB	11	11	W	44542.8	49.00	45.00	13.00	BLACK STAIN	8818
DRT	SCR/CL	0	13	W	1048.90	15.80	12.00	6.25		8798
FELS	CORE	8	2	W	96.42	5.57	4.71	3.94		8638
FELS	HMM/CORE	5	6	W	709.38	9.10	7.06	6.80		8747
FELS	UT FL/B-S-3	5	3	W	10.20	4.05	2.88	0.99		8720
FELS	UT FL/U-CV-2	8	2	W	14.33	3.40	2.57	1.28		8639
FELS	UT FL/U-CV-3	5	9	W	8.16	3.25	3.18	0.96		8771
FELS	UT FL/U-S-1	0	7	W	1.36	2.68	1.77	0.32		8793
GN	MANO/U	0	3	W	879.63	12.50	10.10	4.62		8789
GN	MANO/U	6	8	F					60%	8776
GN	MET	0	18	F						8804
GN	MET	5	6	F						8744
GN	MET	11	6	F						8697
GN	PAINT ROCK	5	5	W	9.10	2.69	1.97	1.15		8743
GN	SCR/CE	0	28	W	297.22	8.74	6.90	3.84		8814

MATERIAL	DESCRIPTION	EU	LVL	W/F	WEIGHT	LENGTH	WIDTH	DEPTH	COMMENT	ACC#
GN	SCR/CE	8	4	W	263.51	8.01	4.96	4.70		8650
GN	SCR/P/2B	6	11	W	233.38	7.54	6.45	3.20		8782
GN	UT FL/U-S-4	5	3	W	17.96	5.33	3.48	0.84		8722
GN?	SCR/P/2C	0	9	W	878.80	8.58	6.64	6.50		8794
GNE	HAM/CH	9	11	W	397.25	8.15	6.20	4.91		8680
GNE	MANO/U	9	9	W	1021.50	13.60	9.63	6.12		8672
GNE	MET	9	12	F						8684
GNG	MANO/U?	5	4	F					<10%	8725
GNG	MET/BASIN	11	5	W	25945.0	48.00	27.00	15.00	BASIN 5 CM DEEP, BLACK STAIN	8816
GNG	PESTLE	7	6	F						8624
GNG	SCR/P/2A	11	6	W	396.68	9.11	7.87	4.24		8699
GNG	UT FL/U-CV-3	11	7	W	89.43	8.04	5.54	2.70		8705
GRDR	MANO/B	0	1	F					20%	8787
GRDR	MANO/B/ES	5	4	W	681.00	9.85	9.67	4.15		8734
GRDR	MANO/B/ES	5	8	F					40%	8760
GRDR	MANO/U	9	8	F					30%	8668
GRNL	HAM/CH	0	18	W	368.88	9.25	6.60	5.27		8803
GRNL	HAM/CH	0	30	W	652.63	9.00	8.02	7.00		8612
GRNL	HAM/CH	0	34	W	340.00	7.28	5.57	4.80	SCR/P/2A	8616
GRNL	HAM/CH	5	6	W	425.63	8.10	5.35	5.04		8748
GRNL	HAM/CH	8	4	W	265.53	8.25	5.91	5.11		8648
GRNL	HAM/CH	9	8	W	295.99	7.00	6.04	5.63	SCR/P/2A	8669
GRNL	HAM/CH	11	6	F						8700
GRNL	HAM/CORE	0	19	W	595.88	8.95	7.07	7.02		8805
GRNL	HAM/CORE	5	4	W	624.25	9.78	8.67	5.73		8738
GRNL	MET	6	7	F						8774
GRNL	RET FL/B-S-4	7	7	W	137.43	10.69	5.66	2.33		8630
GRNL	RET FL/B-S-5	8	3	W	184.75	8.48	7.03	5.61		8641
GRNL	RET FL/U-CC-4	0	5	W	255.93	8.20	7.53	3.00	UT FL/U-S-4	8791
GRNL	RET FL/U-CV-3	5	10	W	49.45	6.22	5.58	1.32	UT FL/B-S-3	8772
GRNL	RET FL/U-CV-4	0	23	W	45.64	5.81	4.62	1.60		8809
GRNL	RET FL/U-CV-4	9	1	W	23.22	4.20	3.55	1.48		8657
GRNL	RET FL/U-CV-5	8	5	W	191.35	9.27	5.34	4.68		8655
GRNL	RET FL/U-CV-5	11	6	W	159.63	8.05	6.45	3.00		8701
GRNL	RET FL/U-S-4	0	27	W	107.20	7.06	5.47	1.92		8813
GRNL	RET FL/U-S-4	5	4	W	167.19	8.68	6.15	2.98	RET FL/U-S-5	8730
GRNL	RET FL/U-S-4	7	6	W	114.01	9.64	5.73	2.37		8628
GRNL	RET FL/U-S-5	5	4	W	167.19	8.68	6.15	2.98	RET FL/U-S-4	8730
GRNL	RET FL/U-SER-5	0	2	W	43.15	5.47	4.78	1.62		8788
GRNL	RET FL/U-SER-5	5	7	W	78.08	7.58	5.98	2.27		8757
GRNL	SCR/CE	0	26	W	50.05	4.82	4.55	1.98		8812
GRNL	SCR/CE	5	9	W	301.56	8.05	8.56	4.42		8769
GRNL	SCR/CE	6	7	W	185.61	8.44	7.79	3.72		8775
GRNL	SCR/CE	7	6	W	296.61	8.70	7.20	5.81		8626
GRNL	SCR/CE	8	4	F						8651
GRNL	SCR/CE	8	4	W	239.68	8.37	6.94	4.71		8649
GRNL	SCR/CE	10	6	W	120.00	7.11	4.90	3.60		8691
GRNL	SCR/CE	11	2	W	59.57	6.91	3.92	2.56		8693
GRNL	SCR/P/2A	0	34	W	340.00	7.28	5.57	4.80	HAM/CH	8616
GRNL	SCR/P/2A	9	7	W	204.14	8.36	6.62	3.12		8666
GRNL	SCR/P/2A	9	8	W	295.99	7.00	6.04	5.63	HAM/CH	8669
GRNL	SCR/P/2A	9	12	W	177.54	6.19	6.30	3.55		8683
GRNL	SCR/P/2B	11	8	W	425.20	10.20	7.16	4.90		8710
GRNL	SCR/P/2B	11	11	W	340.20	9.48	6.99	3.92		8715
GRNL	SCR/P/2C	5	8	W	538.60	11.05	9.10	3.64		8764
GRNL	SCR/P/3	0	31	W	1106.63	11.17	10.97	6.59		8613
GRNL	SCR/P/3	5	5	W	293.68	8.59	7.64	4.25		8742
GRNL	SCR/P/3	5	7	W	368.50	8.79	8.58	3.78		8752

MATERIAL	DESCRIPTION	EU	LVL	W/F	WEIGHT	LENGTH	WIDTH	DEPTH	COMMENT	ACC#
GRNL	SCR/P/3	7	6	W	425.20	10.09	8.80	4.28	BLACK STAIN	8627
GRNL	SCR/P/3	9	8	W	266.45	7.93	7.31	4.14		8670
GRNL	SCR/P/3	9	9	W	368.50	7.08	6.49	5.15		8675
GRNL	SCR/SE	0	16	W	177.68	10.64	5.20	2.16		8801
GRNL	SCR/SE	5	7	W	453.60	12.70	6.68	5.43		8755
GRNL	SCR/SE	8	1	W	283.50	9.07	7.34	4.17		8636
GRNL	UT FL/B-CC-3	7	6	W	197.94	9.54	6.06	2.67		8663
GRNL	UT FL/B-S-3	5	10	W	49.45	6.22	5.58	1.32	RET FL/U-CV-3	8772
GRNL	UT FL/B-S-3	9	9	W	162.43	9.48	8.36	2.94		8676
GRNL	UT FL/U-CC-4	8	3	W	42.45	6.83	3.17	2.35		8642
GRNL	UT FL/U-CC-4	11	7	W	196.28	10.17	6.84	2.87	UT FL/U-S-4	8707
GRNL	UT FL/U-CV-2	10	5	W	74.01	5.80	5.27	2.50		8822
GRNL	UT FL/U-CV-3	5	8	W	13.10	6.15	2.93	0.79		8765
GRNL	UT FL/U-CV-3	11	9	W	44.59	6.02	4.84	1.53		8712
GRNL	UT FL/U-CV-3	11	11	W	17.52	4.76	3.91	1.35		8717
GRNL	UT FL/U-CV-5	0	15	W	93.20	6.47	5.63	2.05		8800
GRNL	UT FL/U-CV-5	5	7	W	115.19	8.57	5.95	2.76		8756
GRNL	UT FL/U-S-2	7	3	W	68.68	8.32	4.51	1.73		8619
GRNL	UT FL/U-S-2	9	12	W	8.18	3.96	2.51	0.90		8685
GRNL	UT FL/U-S-3	5	3	W	7.75	3.22	2.45	1.25		8721
GRNL	UT FL/U-S-3	5	9	W	16.87	4.37	3.40	1.05		8770
GRNL	UT FL/U-S-3	7	5	W	28.37	4.68	4.08	1.37		8622
GRNL	UT FL/U-S-3	9	2	W	9.72	4.30	2.64	1.03		8661
GRNL	UT FL/U-S-4	0	5	W	255.93	8.20	7.53	3.00	RET FL/U-CC-4	8791
GRNL	UT FL/U-S-4	5	7	W	42.35	7.34	4.62	1.32		8759
GRNL	UT FL/U-S-4	11	7	W	196.28	10.17	6.84	2.87	UT FL/U-CC-4	8707
GRNL	UT FL/U-S-5	5	8	W	34.52	6.49	3.53	1.55		8766
GRNL	UT FL/U-S-5	6	9	W	147.11	7.35	7.50	2.10		8778
GRNT	HAM/COB/P	0	22	W	368.88	9.50	5.32	4.34		8808
GRNT	MANO/U	11	7	F					20%	8702
GRNT	MANO/U?	8	3	F					30%	8640
GRNT	MET	5	7	F						8750
GRNT	MORTAR	9	8	F					SHAPED BASE, BURNT	8667
GRNT	SCR/P/2B	8	5	W	595.30	10.95	8.56	4.82		8654
GRNT	SPHERE	7	10	W	482.38	7.54	6.97	6.40		8633
GRNT?	MANO/B	5	8	F					30%	8762
MBST	HAM/COB	0	12	W	454.00	7.50	7.15	5.94		8797
MBST	RET FL/U-CC-5	5	4	W	62.24	5.12	3.91	2.87		8726
MBST	SCR/CE	9	2	W	197.26	7.93	4.62	4.20		8660
MBST	SCR/P/2A	0	21	W	368.50	7.36	7.27	4.94		8807
MBST	UT FL/B-S-1	8	4	W	41.75	7.33	4.48	1.31		8652
MBST	UT FL/U-CV-2	5	4	F						8733
MBST	UT FL/U-CV-5	5	2	W	15.11	4.21	3.21	1.14		8718
MBST	UT FL/U-S-2	6	12	F						8790
MBST	UT FL/U-S-3	6	12	W	2.37	2.53	1.93	0.58		8785
MBST	UT FL/U-S-3	8	4	W	20.83	4.27	3.95	0.97		8653
MBST	UT FL/U-S-4	6	11	W	12.61	3.17	3.04	1.20		8783
MBST	UT FL/U-S-4	7	1	W	28.85	4.78	4.22	3.52		8617
MBST	UT FL/U-S-5	0	25	W	41.48	6.60	3.40	1.75		8811
MBST	UT FL/U-S-5	9	2	W	19.71	5.05	1.17	1.08		8658
MTSD	DISH	0	20	F						8806
MTSD	PAINT ROCK (RED)	10	2	W	181.73	9.18	4.73	4.01		8687
MTSD	PAINT ROCK (RED)	10	2	W	132.54	6.30	3.70	3.28		8688
MTSD	RET FL/B-CV-4	5	4	W	55.30	6.66	4.39	1.64		8732
MTSD	RET FL/B-CV-4	7	5	F						8621
MTSD	RET FL/U-CV-5	0	14	W	258.77	8.06	7.80	3.09		8799
MTSD	SCR/CE	0	17	F						8802
MTSD	SCR/P/2A	5	7	W	249.42	7.66	6.48	3.29		8753

MATERIAL	DESCRIPTION	EU	LVL	W/F	WEIGHT	LENGTH	WIDTH	DEPTH	COMMENT	ACC#
MTSD	SCR/P/2B	9	8	W	221.01	8.12	6.14	3.67		8671
MTSD	SCR/P/2B	9	11	W	147.92	6.32	5.73	3.58		8681
MTSD	SCR/P/2C	0	24	W	680.40	9.14	6.62	6.68		8810
MTSD	SCR/P/2C	9	9	W	226.75	8.91	5.37	3.55		8674
MTSD	SCR/P/2C	11	1	W	261.15	10.54	5.58	3.94		8692
MTSD	SCR/SE	5	4	W	81.60	7.42	4.23	3.02		8727
MTSD	SCR/SE	11	7	W	311.80	8.68	7.16	3.76		8706
MTSD	SCR/SE	11	11	W	510.30	10.32	9.17	3.70		8714
MTSD	UT FL/B-CV-5	6	9	F						8779
MTSD	UT FL/U-CV-5	6	12	W	46.74	8.23	3.71	1.68		8784
MTSD?	SCR/SE	7	6	W	161.42	10.03	6.85	2.66	BLACK STAIN	8629
MTV	RET FL/U-CV-5	10	5	W	5.46	2.93	1.89	1.44		8690
MTV	UT FL/U-S-4	11	4	W	1.94	3.05	1.28	0.50		8696
OBS	DEB	9	5	W	0.47	1.96	0.69	0.44		8662
OBS	POINT/SMALL?	7	11	F					TIP	8634
OBS	RET FL/B-S-4	5	9	F						8821
OBS	RET FL/B-S-4	8	6	W	3.31	2.97	1.71	0.60	USED ON 4 EDGES	8656
OBS	UT FL/U-CV-3	5	3	W	0.19	1.23	0.93	0.18		8719
QZM	UT FL/U-S-3	11	3	W	6.16	3.56	1.85	0.80		8695
QZM	UT FL/U-S-5	6	10	F						8780
QZT	RET FL/U-CC-5	0	11	W	197.54	9.53	6.87	2.58		8796
QZT	SCR/P/2B	5	7	W	595.30	11.32	8.65	5.28		8754
QZT	SCR/P/2B	11	8	W	198.40	7.51	5.98	5.58		8711
QZT	UT FL/B-S-3	5	4	W	157.81	9.33	6.32	2.85		8729
QZT	UT FL/U-CV-3	5	4	W	112.39	6.86	6.20	2.90		8728
QZT	UT FL/U-CV-3	5	4	W	63.71	5.51	5.04	1.97		8731
QZT	UT FL/U-S-2	5	7	W	3.41	3.75	2.71	0.49		8758
QZT	UT FL/U-S-3	5	10	W	8.48	4.19	1.63	1.10		8773
QZT	UT FL/U-S-3	6	8	W	1.95	2.63	1.50	0.64		8777
QZT	UT FL/U-S-4	9	2	W	23.44	4.87	3.43	1.32		8659
QZT	UT FL/U-S-5	5	6	W	204.38	7.91	7.60	3.55		8749
RHY	UT FL/B-CV-4	7	3	W	5.02	4.98	1.30	0.89		8618
SCH	HAM/COB/P	9	10	F						8679
SCH	MET	5	4	F						8736
SCO	MANUPORT	9	9	W	71.21	6.26	5.52	3.25		8677
SDSTA	MORTAR/BOWL	5	4	F					RIM	8739
SDSTA	PESTLE	0	32	F						8614
SKARN	PAINT ROCK?	11	7	W	1020.00	12.00	11.00	5.75		8815
SKARN	PAINT ROCK?	11	11	W	567.00	10.13	8.71	4.58	HAND SHAPED	8713
VCFC	MORTAR	0	33	F					SHAPED BASE	8615

APPENDIX D

Identification And Sources Of The Lithic Materials From CA-SBr-895

By

Debra A. Digua

CONTENTS

THE SAN GABRIEL MOUNTAINS: Rocks and Geologic History

Some ancient rocks in the San Gabriel Mountains were formed over 1 billion years ago (Norris and Webb 1976:209). Later these rocks were altered by the heat and pressure associated with the intrusion of plutonic rocks. There were three intrusive episodes prior to the beginning of the Paleozoic Era, approximately 550 million years ago. The older metamorphic rocks are the Mendenhall Gneiss with an age of about 1440 million years, and a distinctive augen gneiss that originated as a porphyritic granite about 1670 million years ago. The intrusives are of three rock types: anorthosite, diorite, and granite. The anorthosite has been dated at 1220 million years (Ehlig 1975:179). Precambrian igneous and metamorphic rocks in the Cucamonga area are represented by the Cucamonga Complex.

Following the intrusive episodes, the entire rock mass was elevated and exposed to the forces of weathering and erosion. These conditions prevailed for millions of years, and volumes of material was removed and deposited to the west. Near the close of the Paleozoic Era, most of the San Gabriel Mountain area was a depositional environment for marine sediments. Subsequent metamorphic and orogenic activity altered the original sedimentary rock complex to crystalline limestone and quartzite that are today found east of San Antonio Canyon. Pre-Cretaceous rocks in the study area are located in a zone north of the Cucamonga Complex.

Uplift of the area began during early Mesozoic time. This was the beginning of large-scale mountain building in the region and extensive plutons of granitic rock were intruded in at least two, and possibly four episodes, occurring at different intervals throughout the area. These Mesozoic granitic rocks dominate the

San Gabriel Mountains. They range in composition from granite to quartz monzonite, with some syenite and diorite. They constitute almost 70% of the exposed rocks in the range. The Mesozoic granitic rocks in the Cucamonga area are located north of the Pre-Cretaceous rock zone north of the Precambrian Cucamonga Complex. The San Gabriel Mountain area has been elevated and subject to erosional processes since the Mesozoic.

Sometime during the Miocene, prior to 15 million years ago, east-west faults developed and the mountains began to assume their east-west alignment. Other faulting activity was initiated and accompanied by volcanism in the form of hypabyssal intrusives and extrusive lava flows. The Glendora Volcanics and the Tertiary intrusives east of San Antonio Canyon formed during this time. During the middle Miocene, the sea began advancing over the Los Angeles Basin from south to north until by the close of the Miocene, the sea had reached the base of the San Gabriel Mountains.

The San Gabriels underwent slow, continual, uplift during the late Miocene and Pliocene. The sea receeded from the San Gabriel Mountains during the Pliocene, and by the middle Pleistocene the shoreline was located near the Whittier fault zone. Marked uplift continued into the Pleistocene. The last major deformational episode to affect the region, the Pasadenan orogeny, was initiated and appears to be a strong operational force. As the mountains rose, streams began down-cutting more rapidly and great V-shaped canyons formed with large alluvial fans developing at the mouths of the canyons on both the north and south flanks of the range.

During recent times uplift appears to have lessened, producing steep, narrow, rejuvenated stream gorges. The discharge from these streams dissected the older fans, and extensive covers of recent sediments were deposited. Large exposures of Recent alluvium occur throughout the Cucamonga area.

Prior to the initiation of the fieldwork, various sources (i.e., Bailey and Jahns 1954, Rogers 1967, and Martz 1976) were consulted in reference to what types of lithic materials might be expected in and around the area of SBr-895. The purpose of this research was to determine what the locally occurring rock types were, and to become familiar with the characteristics of these rocks in order to determine which local materials were used for tools and which, if any, were imported to the site. It was important to have a working knowledge of the lithics before fieldwork commenced because previous work done at the site indicated that innumerable fragments of naturally occurring rock were present in the deposit. Two texts (Compton 1962, Huang 1962) were referred to for descriptions of the rock types anticipated to be at the site.

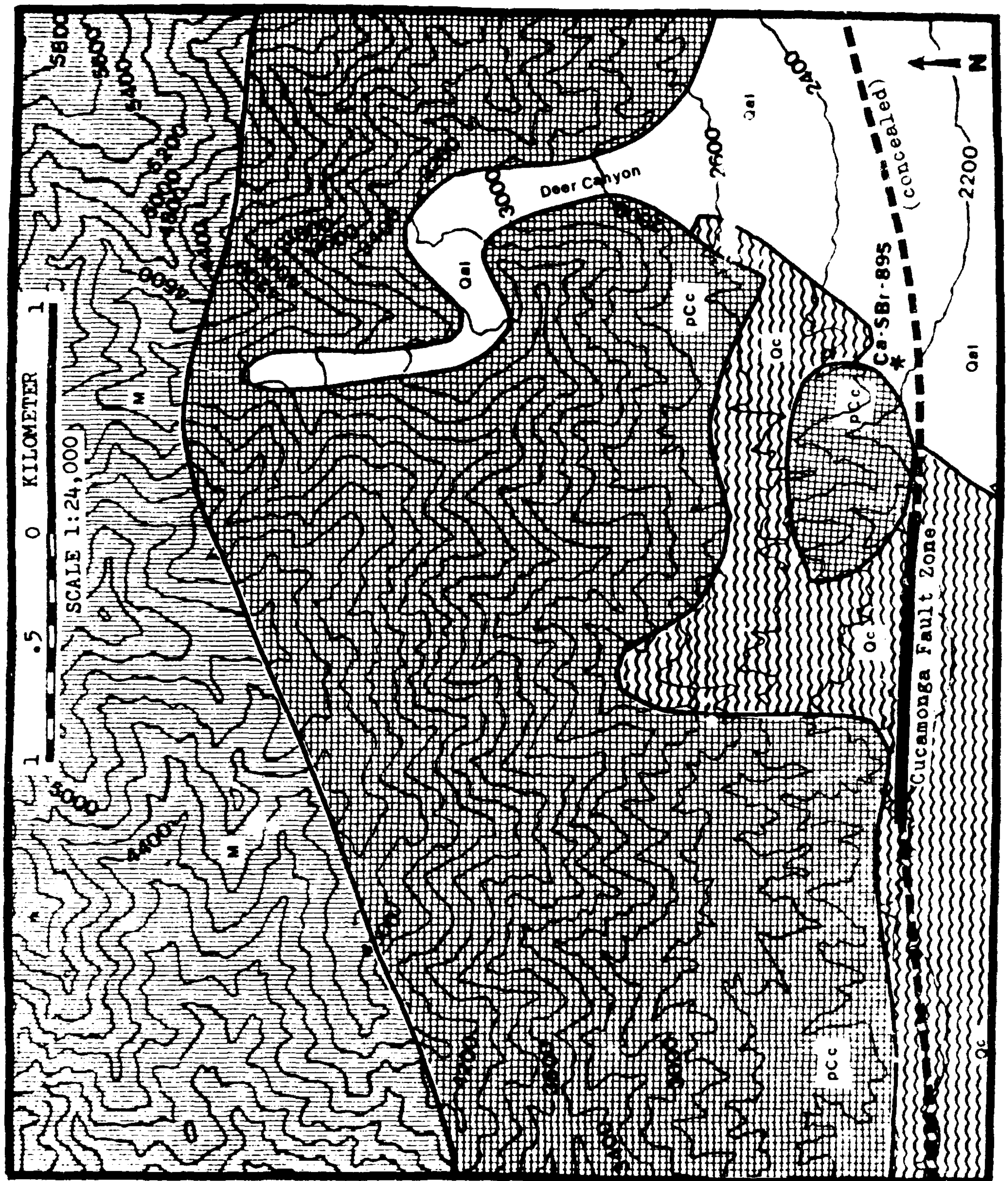
During fieldwork, a non-artifactual rock sample was collected from the surface of the site and its vicinity between Deer Canyon and Demens Canyon. This material provided a baseline of naturally occurring lithics against which the artifactual rock types could be measured. Another sample of non-artifactual rocks was taken from each level of Unit #9.

The lithic materials from SBr-895 were classified as either igneous, metamorphic, or sedimentary rocks by means of megascopic determination of those physical properties that are characteristic of each group. The rock sample was then sorted and rocks of the same type as those in the artifact inventory were selected and cracked open to obtain a fresh surface for mineral identification. Specific identification of the rocks was accomplished by consultation with three geologists (Gibson, and Drs. Wagner and Williams) who were shown the artifacts and rocks from the sample along with the Geologic Map of California (San Bernardino Sheet), and the USGS 7.5' Topographic Quadrange Maps for Cucamonga Peak and Mount Baldy.

Conclusions regarding the rocks identified as being of local occurrence were based, in part, on the rock types found in the non-artifactual rock sample. The sample contained the following types of rocks which are listed in order of their frequency within the sample: gneisses, cataclastic, metasediment, granulite, granite, diorite, pegmatite, schist, quartzite, metabasalt. Any artifacts of the rock types listed above are considered to have been manufactured from locally available materials (see Map #6).

Conversely, those rock types not found in the sample, but present as artifacts, are inferred to be materials imported to the site. For example, obsidian is an imported material, although its source is yet to be determined. Chalcedony is thought to have originated in the Mojave Desert. The other volcanics (rhyolite, andesite, scoria, etc.) are thought to be imported to the site from either of two probable source areas: the Miocene Glendora Volcanics located west of San Dimas Canyon, and an area containing Tertiary hypabyssal intrusive rocks east of San Antonio Canyon (both areas are circled on Map #7). Both of these locations are noted as containing rock types that are similar to those found as artifacts.

The skarn has only one apparent source area and that is at the same location as the Tertiary intrusives (east of San Antonio Canyon), where exposures of limestone are in contact with the igneous rock and presumably metamorphosed into skarn. A speculative source area for the arkosic sandstone are exposures of Miocene marine sedimentary units found with the Glendora Volcanics. These marine units are also the possible source for the dark "chalcedony" and chert which are thought to form in the type of environment that resulted in these units. The "chalcedony" gets its dark color from carbonaceous impurities. The only other units that contain similar types of "chalcedony" are located in the Santa Ana Mountains.



Qal RECENT ALLUVIUM

Qc PLEISTOCENE NON-MARINE SEDIMENTS

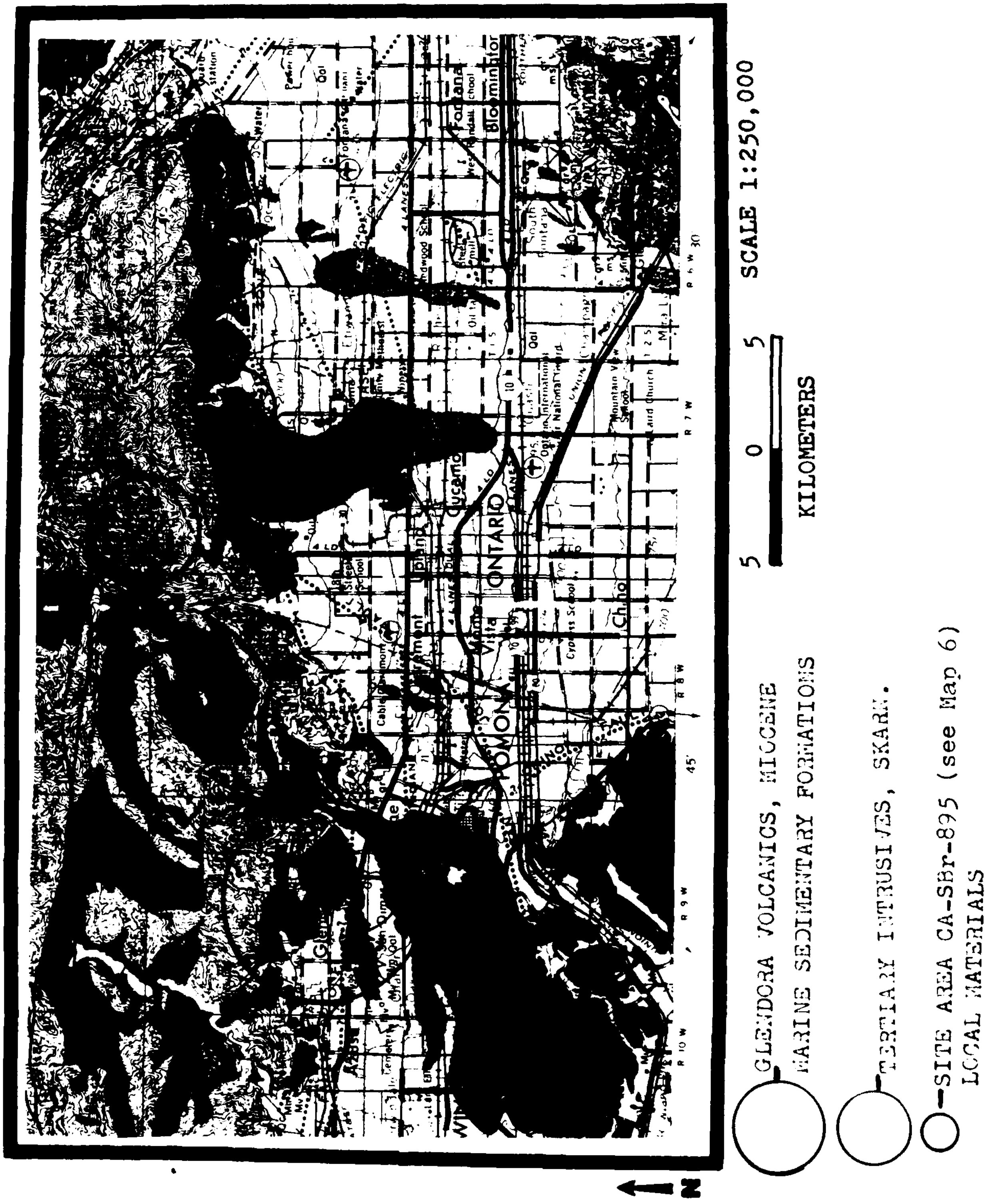
M PRE-CRETACEOUS METAMORPHIC ROCKS

pCc PRECAMBRIAN IGNEOUS AND METAMORPHIC ROCKS

CONTOUR INTERVAL 200 FEET

MAP #6 - GEOLOGY OF THE SITE ENVIRONS, CA-SBr-895.

(adapted from: USGS 7.5'Topo Quad Cucamonga Peak 1980 & Geologic Map of Calif.-San Bernardino Sheet1967)



MAP 7: LITHIC SOURCE AREAS

(adapted from Rogers,1967)

METAMORPHIC ROCKS

Metamorphic rocks are derived from pre-existing rocks by the action of heat, pressure, and chemical changes associated with the processes of metamorphism. Alteration of rocks may result from any of several types of metamorphism of which contact and regional are the most common.

Characteristics of Metamorphic Rocks

Metamorphic processes usually result in the recrystallization of the parent rock whose textural fabric indicates the type of environment in which it was formed. The size, shape, and arrangement of the crystal texture in metamorphic rocks is called the fabric. There are three general types of fabric commonly found in metamorphic rocks: foliated, nonfoliated, and cataclastic.

Almost all of the metamorphic rocks utilized as artifacts at the site were derived from local rock units. The one exception is called skarn, and this rock is believed to come from the same area as the Tertiary intrusives located east of San Antonio Canyon. The other types of metamorphic rocks are representative of the local basement units, and may have been picked up almost anywhere within the site environs; they are: gneiss, schist, granulite, quartzite, cataclastic, metasediment, metabasalt/ metavolcanic. These materials are shed from two units of basement rock which form the southern margin of the San Gabriel Mountains, from San Antonio Canyon east to Lytle Creek. The older unit is composed of Precambrian igneous and metamorphic rocks that within the area is termed the Cucamonga Complex; it is a complicated series of varied lithologies that include the gneiss, quartzite, and granulite found at the site. North of the Cucamonga Complex is a zone of Pre-Cretaceous metamorphic rocks that, in part, are composed of schist, cataclastics, metasediments, and metavolcanics. Both of the rock units mentioned above were affected by episodes of large-scale regional metamorphism, and by localized processes of deformation produced within the Cucamonga fault zone.

Gneiss is a general term used to describe a coarse-grained, quartzofeldspathic rock with characteristic gneissic structure (layering of alternating light (silicic) and dark (mafic) minerals), that is produced by regional metamorphism. Gneisses are named for some distinguishing feature such as characteristic minerals (e.g., garnet gneiss), or structural elements (e.g., banded gneiss). Gneissic rocks at SBr-895 were used mainly for ground stone and scraping tools. The types of geniss present are banded gneiss, garnet gneiss, epidote gneiss, and veined (quartz) gneiss.

Granulite is formed at high pressures and temperatures during regional metamorphism. It is a dark colored, even-grained granoblastic rock, that is very dense and holds up well under repeated pressure, making it suitable for use by the prehistoric inhabitants of the site as hammers, scrapers, and flake tools.

Metasediments, as a group, can be described as low grade metamorphosed argillaceous rocks, some of which possess relict bedding planes. The characteristics of this rock type are so indistinct that to identify them in finer detail would be unwarranted. These rocks were used in a variety of chipped stone tools found at the site.

Cataclastics are produced by a mechanical deformation of rocks during episodes of cataclastic metamorphism associated with mountain building activity. The initial stages of deformation result in granulation of mineral grains, and continued shearing stress produces the progressive attrition of minerals and rock particles. Cataclastic rocks are subdivided according to the degree of granulation of the rock, and the rocks used for artifacts at SBr-895 range from micro-breccia types to pulverized forms. These rocks are compact and hard and were used for heavy-duty tools such as hammers.

Quartzites are granoblastic rocks formed either by contact or regional metamorphism and are composed chiefly of quartz. They usually represent altered sandstones or cherts. They are homogenous rocks and were highly suited for used as flake tools at the site.

Schist is a regional metamorphic rock whose name signifies it's characteristic schistose foliation. Artifacts of schist are not at all numerous at the site, and this may be due to the unsuitability of the material, as it deteriorates rapidly from weathering.

Metabasalt and metavolcanic rocks in the area are derived from metamorphosed dikes of basalt, andesite, and rhyolite. These are fine-grained porphyritic rocks that are dense and have conchoidal fracture suitable for used in flaked tools, such as the ones found at the site.

IGNEOUS ROCKS

Igneous rocks are formed from molten material (magma) in either of two ways: 1) intrusive (plutonic) igneous rocks are produced by emplacement of a body of magma below the ground surface, which allows a slow rate of cooling that results in a medium to coarse-grained, phaneritic rock; 2) extrusive (volcanic) igneous rocks are formed when magma is forced to the surface as lava flows or pyroclastic ejecta that cool so rapidly that in some cases the crystals have no time to form, producing a volcanic glass, i.e., obsidian. Usually they are fine-grained rocks.

Descriptions of Plutonic Rocks & Artifacts

Plutonic rocks selected for use at the site include granite, granodiorite, and diorite. These rocks are formed in similar environments as the batholiths in mountain ranges, or in smaller intrusive bodies such as dikes and sills. The San Gabriel Mountains batholith of Mesozoic granitic rocks sheds material to stream canyons within the local site environs.

Granite and granodiorite are silicic rocks characterized by quartz in amounts of more than 10%. In granites orthoclase feldspar predominates over plagioclase, and quartz may be present in amounts of up to 40%. Granodiorite contains less quartz than granite and has plagioclase feldspar in greater amounts than orthoclase. Characteristic accessory minerals of granites and granodiorites are muscovite, biotite, and hornblende. These rocks are mostly medium to coarse-grained with subhedral-granular or granitoid texture.

Diorite is intermediate between granites and gabbros in its silica content. Most diorites lack quartz, but some contain up to 10% quartz. Diorite is composed chiefly of plagioclase with such minerals as hornblende, biotite, and pyroxene commonly occurring as accessories. Diorites have a variable texture, and can be subhedral-granular, anhedral-granular, or porphyritic, and are typically medium to coarse-grained.

The artifacts of granite are, for the most part, ground stone. The granite ranges from a fine-grained, white variety with less than 2% biotite (1 artifact -"sphere") to a medium to coarse-grained variety with biotite and hornblende combined at about 15% (slab metate, manos, etc.). The granodiorite is a medium-coarse-grained rock with accessory biotite and hornblende together in amounts of about 20%. This rock type was used for manos.

Diorite was used for numerous manos and some metates in the form of a medium-grained rock containing about 2% quartz, with accesory green and/or black hornblende and biotite mica occurring together at 15-20%.

Description of Volcanic Rocks & Artifacts

Volcanic rocks present as artifacts include rhyolite, andesite, scoria, obsidian, felsite, and a fine-grained volcanic. None of these rock types are found in local rock units. The probable source area of the obsidian is the Mojave Desert; the other rocks possibly have their source in an area southeast of Mount Baldy where Tertiary hypabyssal intrusives occur, or in an outcrop of Miocene volcanics in the Glendora area (see Map #7 and section on techniques of lithic sourcing).

Rhyolite is the extrusive aphanitic equivalent of granite. Some rhyolites retain the flow structure of the original lava, and the rocks are typically porphyritic, with phenocrysts of quartz, sanidine, and plagioclase in a fine-grained groundmass. Andesitic lavas have plagioclase as the major constituent, though alkali feldspar may occur in small amounts, and quartz is present in the groundmass. Phenocrysts of common accessory minerals such as biotite, hornblende, and other ferromagnesium minerals occur, as well as phenocrysts of feldspar. Obsidian is formed by the super-cooling of a lava resulting from the rapid drop in temperature which prohibits crystallization and produces a volcanic glass, usually a glossy, jet black color. Lava flows containing gas vesicles yield a rock riddled with air bubbles, which is said to be vesicular. When a rock contains numerous vesicles, it is called a scoria.

Only one flake tool was made of rhyolite, and none of this material (a fine-grained red rhyolite) was recovered as debitage. A few artifacts were made of andesite: a mortar fragment of gray-green andesite with phenocrysts of biotite and hornblende; a mano fragment of vesicular red andesite with biotite phenocrysts; and a manuport of red andesitic scoria. Obsidian artifacts (four flake tools and one piece of debitage), are a glossy, black volcanic glass with no obvious inclusions.

SEDIMENTARY ROCKS

Sedimentary rocks are divided into two groups: Detrital sediments and chemical sediments. Detrital sediments are those made up of the fragments of weathered rock, and are called clastic rocks. Clastic rocks are categorized by the size and sorting of the clastic particles into groups such as conglomerates, sandstone, or shales. Chemical sediments are precipitated from aqueous solutions, usually in marine environments; they may be divided into the following groups based on chemical composition: carbonates (limestone, dolomite), evaporites (halites, gypsum), and siliceous rocks (chert).

Description of Sedimentary Rocks & Artifacts

Only one clastic sedimentary rock is found in the artifact inventory. This is an arkosic sandstone (contains much feldspar) represented by two fragments of ground stone (pestle and mortar). The sandstone is undeformed and assumed to be Miocene or Pliocene in age and nonlocal in occurrence. The probable source of this rock can be vaguely identified as the nearest undeformed marine sandstone unit of Miocene or later age, because it is similar to rocks found in these types of formations. Chemical sediments are in the form of cryptocrystalline siliceous rocks, chert and chalcedony, which are also non-local in occurrence. There are two varieties of chalcedony at the site: a light-colored chalcedony believed to occur in the desert as geodes, or amygdules and a dark chalcedony that, along with the cherts, is believed to have been produced in a marine environment. The chalcedony and chert are ideal rocks for use as flake tools because they possess controllable conchoidal fracture. Chalcedony flake tools and debitage are present, while chert is represented only by waste flakes.

GEOLOGIC TIME SCALE

ERA	PERIOD	EPOCH	AGE IN MILLION YRS	SAN GABRIEL MTNS
Cenozoic	Quaternary	Holocene	(11,000)	Stream deposits
		Pleistocene	1.8	Alluvial fans
	Tertiary	Pliocene	4.8	Uplift Receeding seas
		Miocene	22	Glendora Volcanics
		Oligocene	40	Tertiary
		Eocene	60	Intrusives
		Paleocene	64	Faulting
Mesozoic	Cretaceous		135	Batholith intrusive episodes
	Jurassic		180	
	Triassic		225	
Paleozoic	Permian		270	Marine sediments
	Pennsylvanian			Advancing seas
	Mississippian		350	
	Devonian		400	Erosion
	Silurian		440	Uplift
	Ordovician		500	
	Cambrian		600	
Precambrian			3600	Intrusive episodes
Origin of the Earth			4600	

Table #11::Geologic Time Scale

GLOSSARY

amygdule(s) - are formed in gas cavities in an igneous rock by secondary minerals (quartz, chalcedony) deposited by hydrothermal solutions.

anhedral - describes a crystal of indeterminate shape that has failed to develop any bounding crystal faces.

aphanitic - textural term applied to a rock composed of crystals that are too small to be seen by the naked eye.

argillaceous - said of rocks composed chiefly of clay minerals.

basement - usually, a complex series of igneous and metamorphic rocks of Precambrian age that extend over a large area and are unconformably overlain by younger rocks.

batholith - a large, plutonic body, more than 40 square miles in area, that is composed of medium to coarse-grained granitic (or quartz monzonite) rocks.

cataclastic rocks - these rocks have a fabric of crushed, and angular fragments and are produced by the mechanical deformation of hard rocks during cataclastic metamorphism.

contact metamorphism - a local process involving the rocks at or near the contact with an igneous body; changes in the surrounding rock are produced by heat and materials coming from the magma, and some deformation may result during emplacement of the igneous rock.

cryptocrystalline - textural term applied to rocks whose crystal structure is so small it must be viewed under the microscope.

feldspars - these are a group of minerals; orthoclase, albite, and anorthite that make up more than 50% of all igneous rocks. Albite and anorthite form the plagioclase series of feldspars (oligoclase, andesine, labradorite); orthoclase and albite form the alkalic feldspars (microcline, sanidine, orthoclase). Alkalic feldspars occur widely in silicic rocks; whereas plagioclase feldspars occur throughout a range of silicic to ultramafic rocks.

ferromagnesian - describes dark silicate minerals containing iron and magnesium (i.e., biotite, amphibole, pyroxene).

foliated rocks - a foliated texture is usually found in rocks deformed during regional metamorphism; it results from intense heat and pressure which causes the segregation and parallel orientation (realignment) of minerals giving the rock a layered or banded appearance. Foliation in rocks can be subdivided as to the degree of perfection in the parallel surfaces: slaty cleavage (most perfect), schistosity, and gneissic layering (least perfect).

friable - said of rock or soil that can be easily crumbled (i.e., a loosely cemented sandstone).

hypabyssal - intrusive igneous rocks that have crystallized at depths intermediate between plutonic and surface-cooled rocks.

inclusion - a crystal or fragment of older rock within a rock to which the inclusion may or may not be genetically related.

nonfoliated rocks - nonfoliate rocks are for the most part either granoblastic (granular) or granulose (equidimensional) in habit, and this fabric is usually developed in rocks altered by contact metamorphism or in rocks whose minerals resist realignment.

phaneritic - textural term applied to rocks having crystals large enough to be seen by the naked eye.

phenocrysts - these are the visibly large crystals discernible within the fine-grained groundmass of some igneous rocks.

porphyritic - a textural term describing an igneous rock containing larger crystals (phenocrysts) set in a fine-grained groundmass.

pyroclastic - a volcanic rock with fragmented texture produced by its explosive ejection from a volcanic vent.

quartzofeldspathic - a term used to describe rocks in which quartz and feldspars are the dominant minerals.

regional metamorphism - affects extensive areas of rocks during large-scale mountain building (orogenic) activity which produces deformation in rocks by not only heat and pressure but also powerful shearing forces (cataclastic metamorphism).

reverse-fault - a fault along which the hanging wall (the rock above the fault plane) has been raised relative to the footwall (the rock below the plane). Reverse faults with a dip of less than 45^{o} are called thrust faults.

right-lateral fault - a fault in which there has been strike separation to the right that is, separation parallel to the strike of the fault. In a right-lateral fault the side opposite the observer appears to have moved to the right.

silic - applied to silica-rich igneous rocks in which silica constitutes at least 65% of the rock.

skarn - carbonate contact metamorphic rock which effervesces in hydrochloric acid. It is a white, friable rock with granulose texture that may have been produced by hydrothermal metamorphism upon limestone

subhedral - describes a crystal that is partly faced; between euhedral and anhedral in structure.

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APPENDIX E

SOIL STRATIFICATION

As was mentioned in Section 4.0, upon completion of each unit, photographs were taken of each wall and profiles were drawn of at least two walls of all units.

Plate 5 depicts the south wall of Unit #6 with a metate (#8820) in situ in the 100 cm excavation level. Plate 6 shows the same wall upon completion of the unit at 130 cm (compare to Figure 4 profile). The 7 cm diameter iron pipe crosses the unit near the surface. The north wall of Unit #9 is illustrated in Plate 7 (compare to Figure 7 profile), after completion at 120 cm.

Note that in the profile drawings and layer descriptions that follow layers designated A, 1, and 11 were found across all units. Layer 111 was found in all units in the central area and absent in Units 8 and #10 near the stream bank. The sterile basal conglomerate (stippled in the profiles) is designated Layer IV in Units #7, 8, 19, and 11, Layer V in Unit #9, Layer V1 in Unit #5, and Layers V1 and V11 in Unit #6.

John Milburn, who served as stratigrapher on the project, provided the following layer descriptions.

Label A: All Units

Organic litter mat, identical to Layer 1 but with matted frass, roots, grass, and twigs. Irregular due to disturbance. Slightly more prominent in Unit 8 next to the creek.
Boundary: Clear
Munsell: (10YR 3/2) very dark greyish brown

Label I: All Units

Sandy loam/loamy sand, friable, non-plastic. Estimate of non-clastic composition: 5% clay, 10-15% silt, 80-85% sand. Sand predominately very fine/fine sand 60%, 25% medium sand, 15% coarse

Plate 5: Excavation Unit #6, South Wall, 100 cm Floor.

Plate 6: Excavation Unit #6, South Wall, 130 cm Floor.

Plate 7: Excavation Unit #9, North Wall, 120 cm Floor.

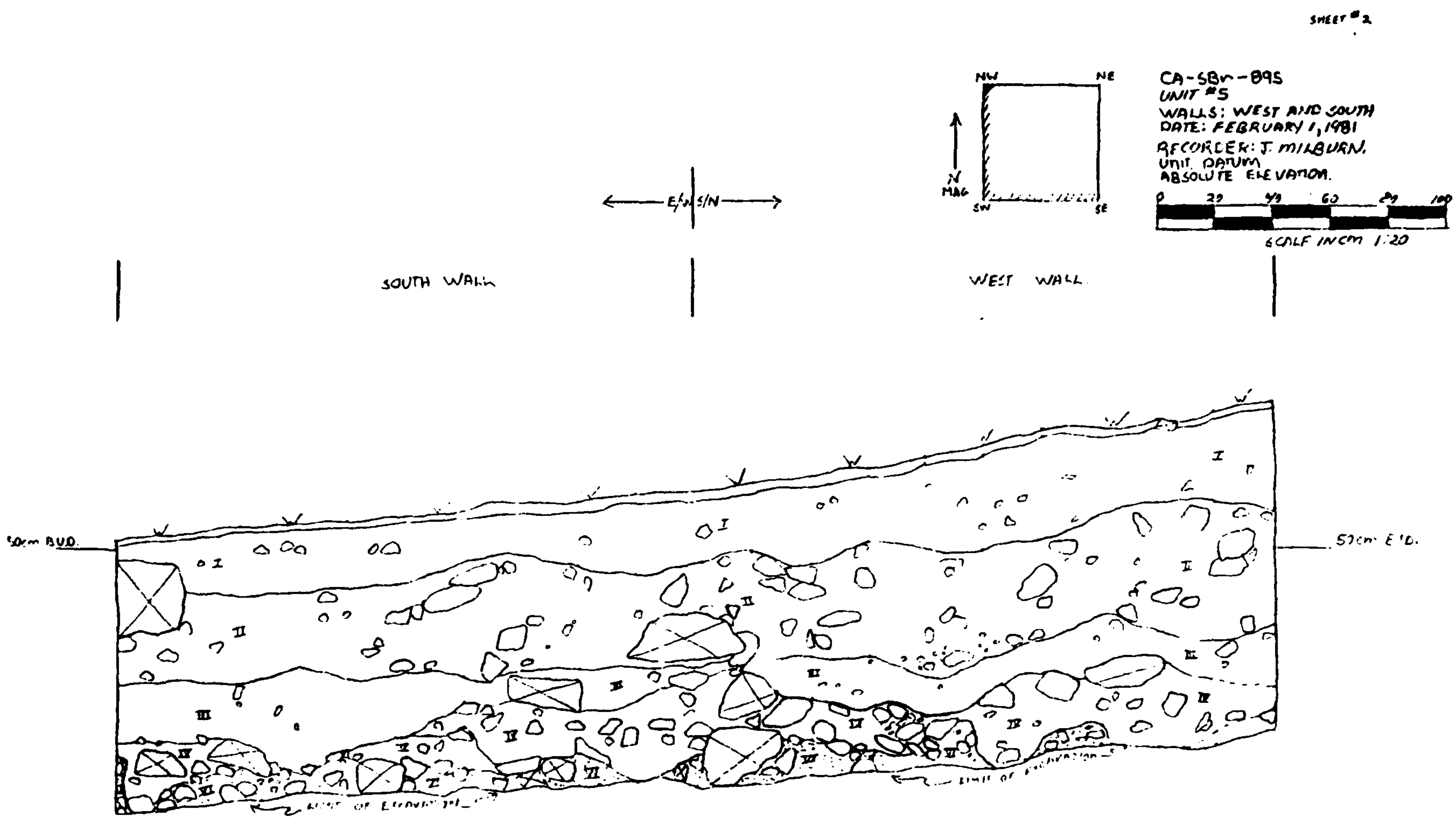

FIGURE 3: Excavation Unit #5 - South/West Wall Profiles

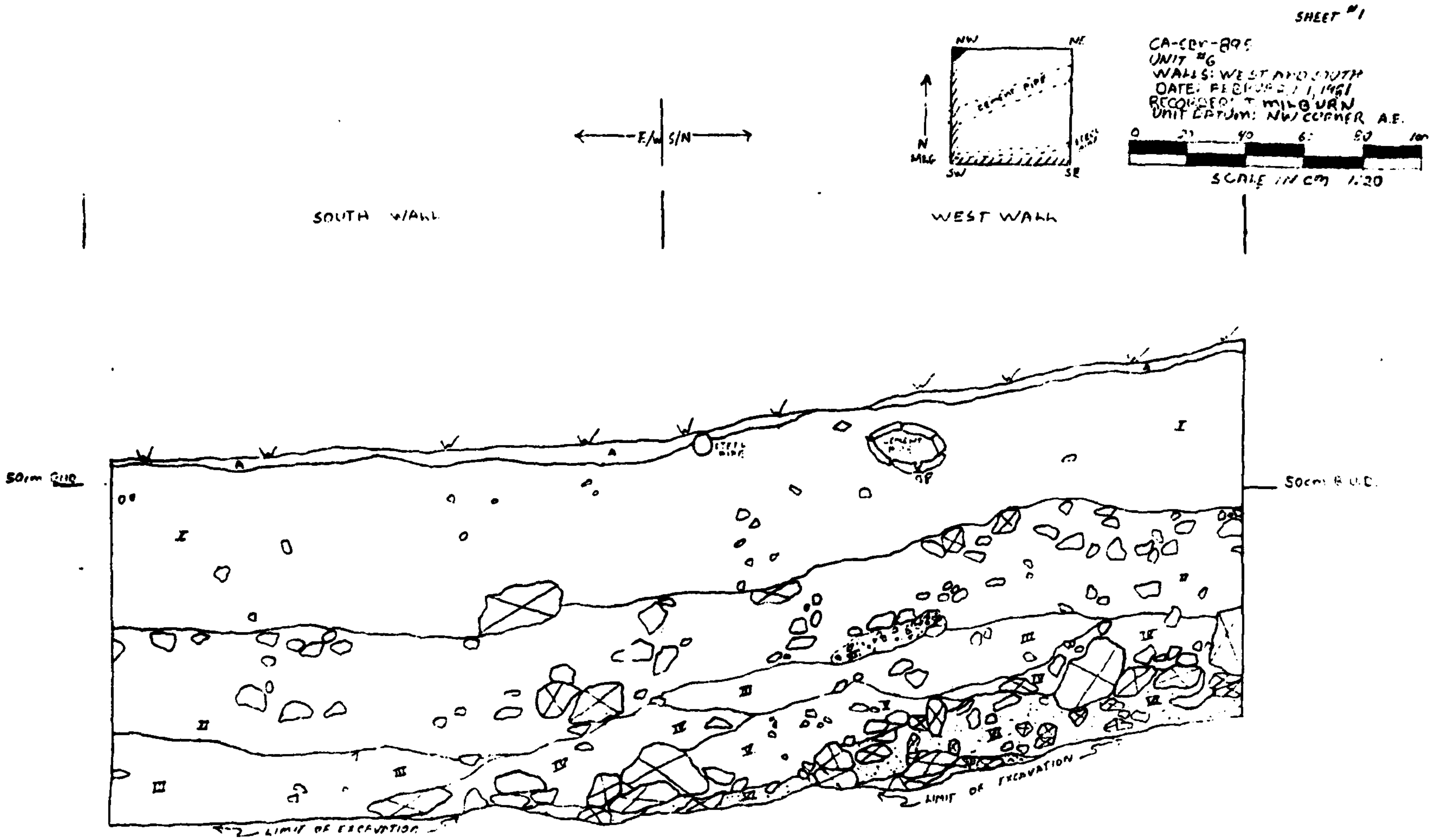

FIGURE 4: Excavation Unit #6 - South/West Wall Profiles

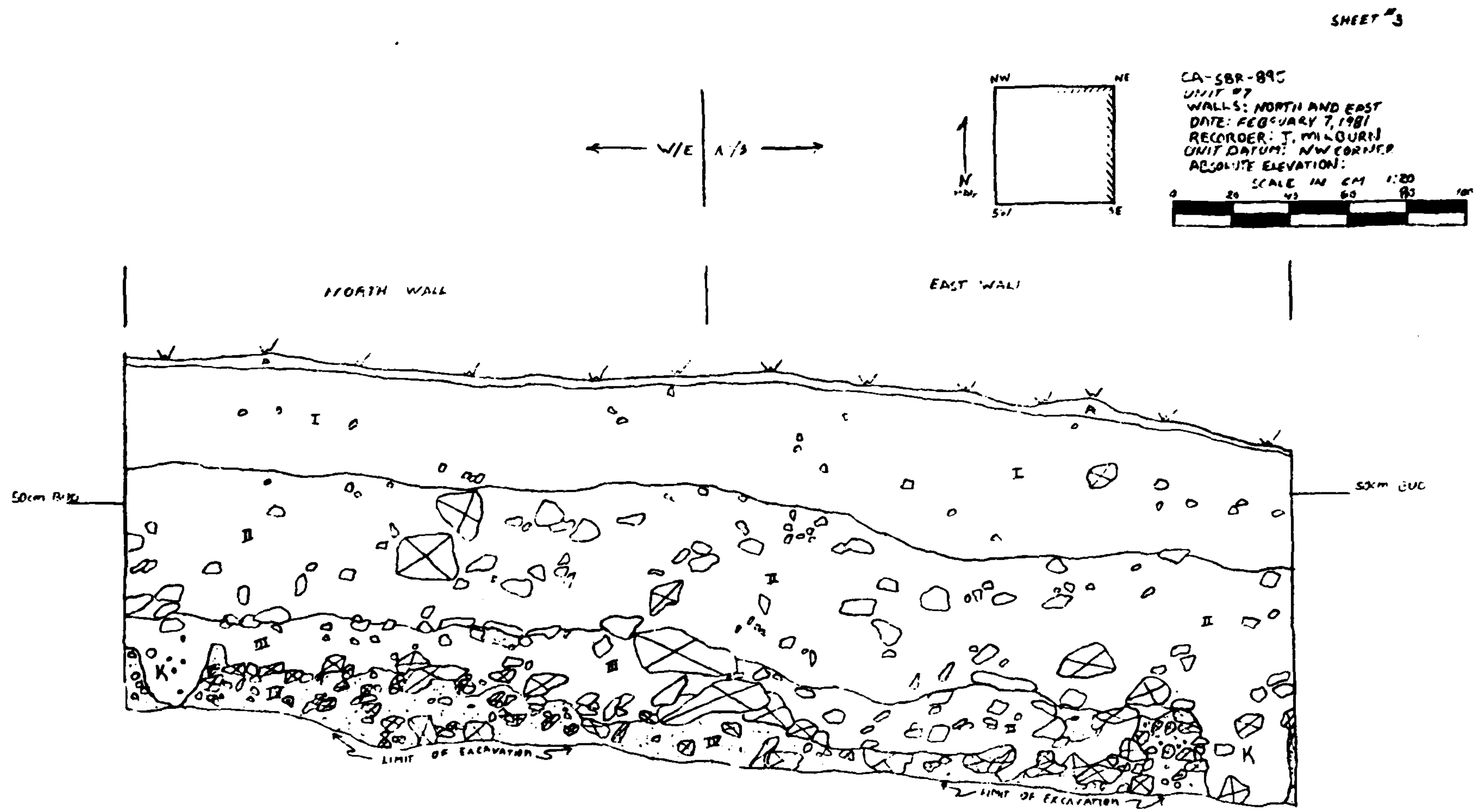

FIGURE 5: Excavation Unit #7 - North/East Wall Profiles

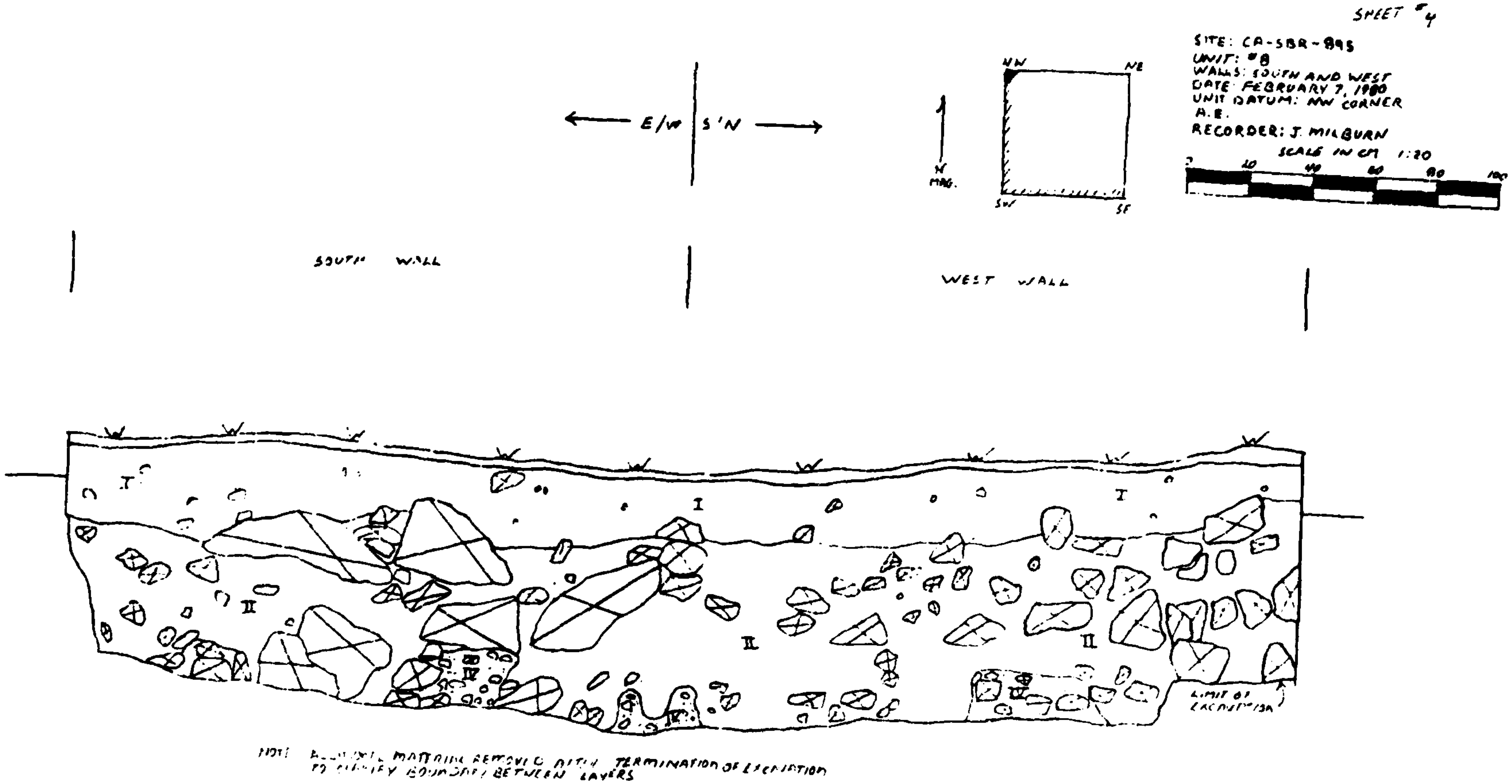

FIGURE 6: Excavation Unit #8 - South/West Wall Profiles

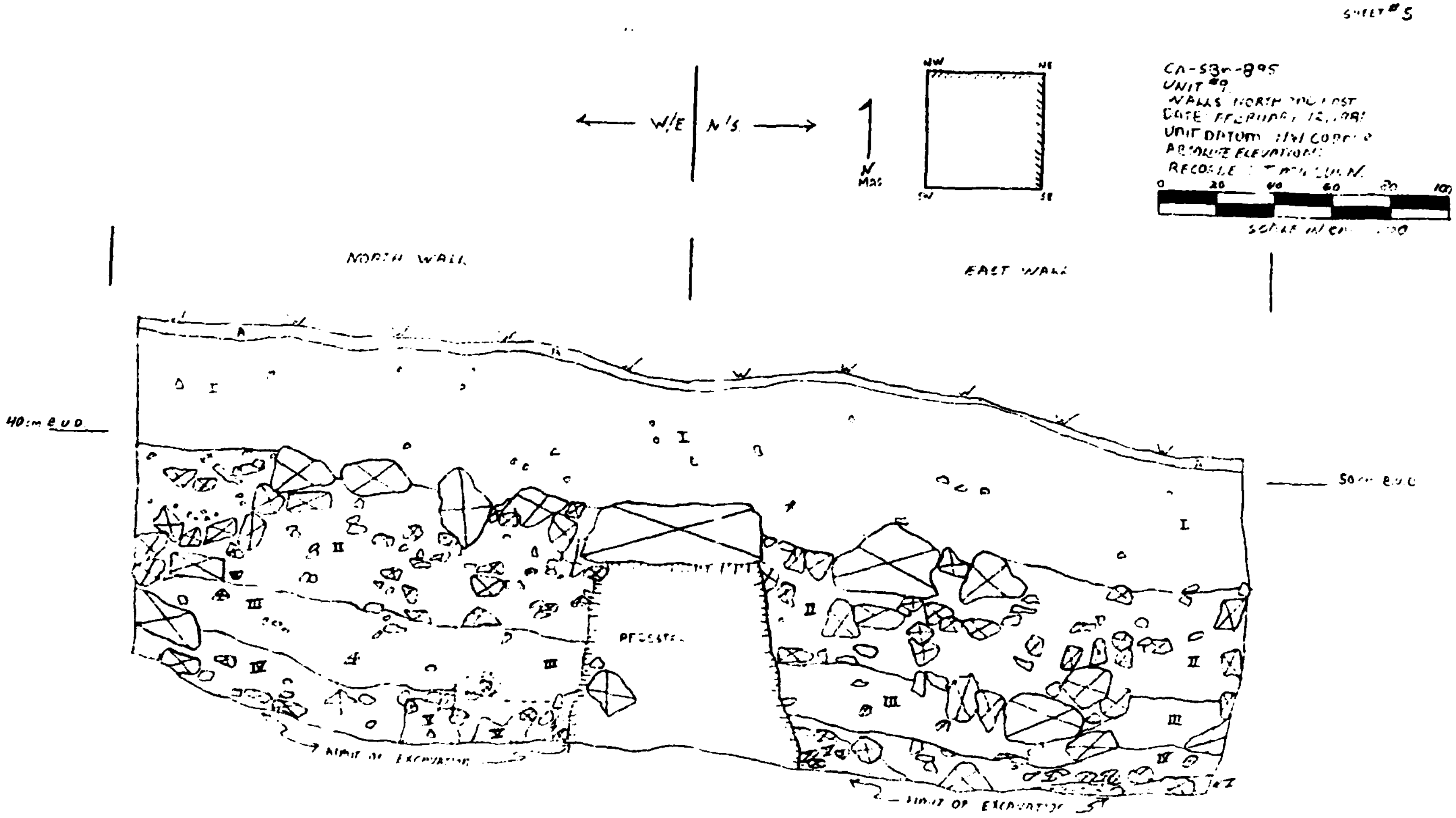

FIGURE 7: Excavation Unit #9 - North/East Wall Profiles

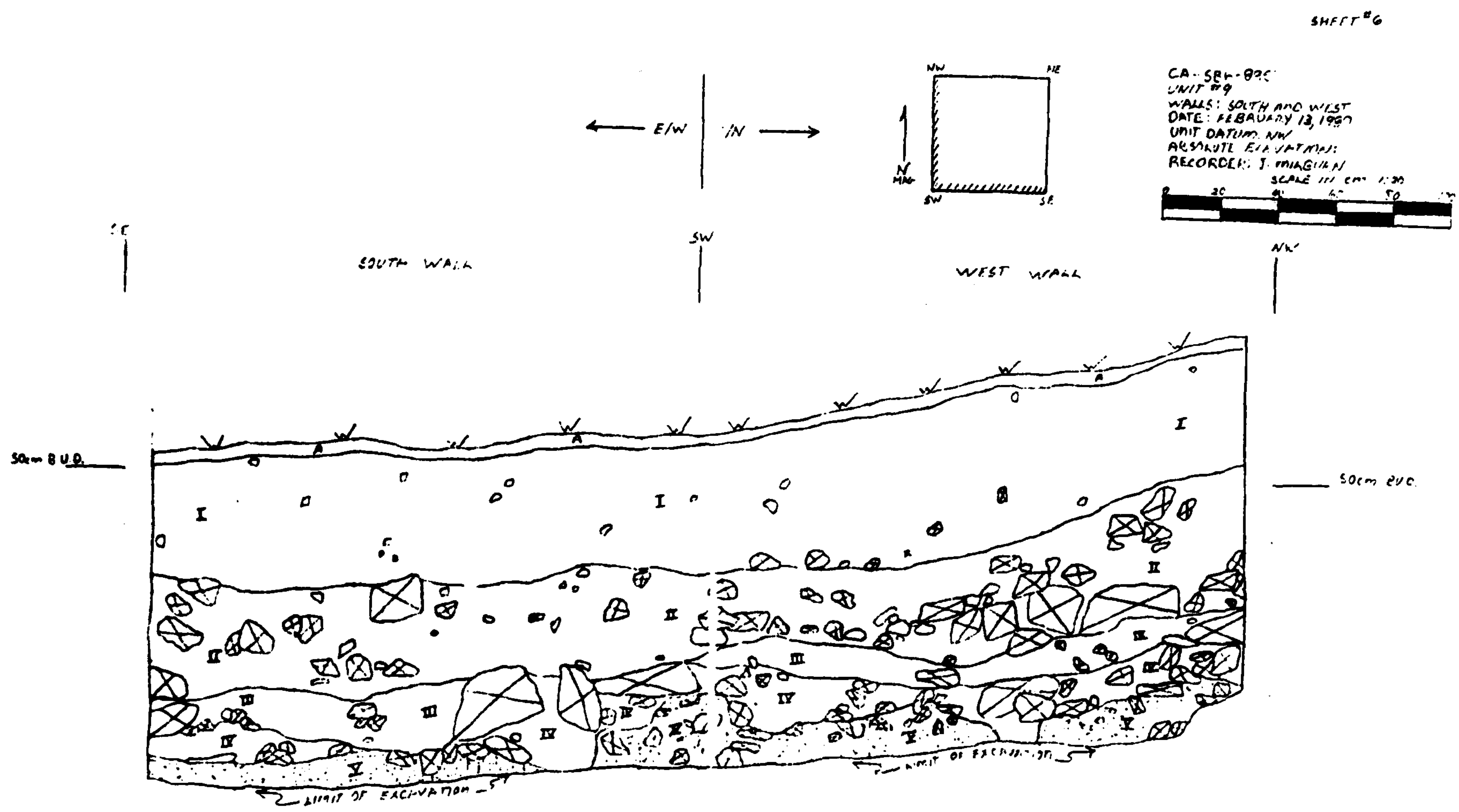

FIGURE 8: Excavation Unit #9 - South/West Wall Profiles

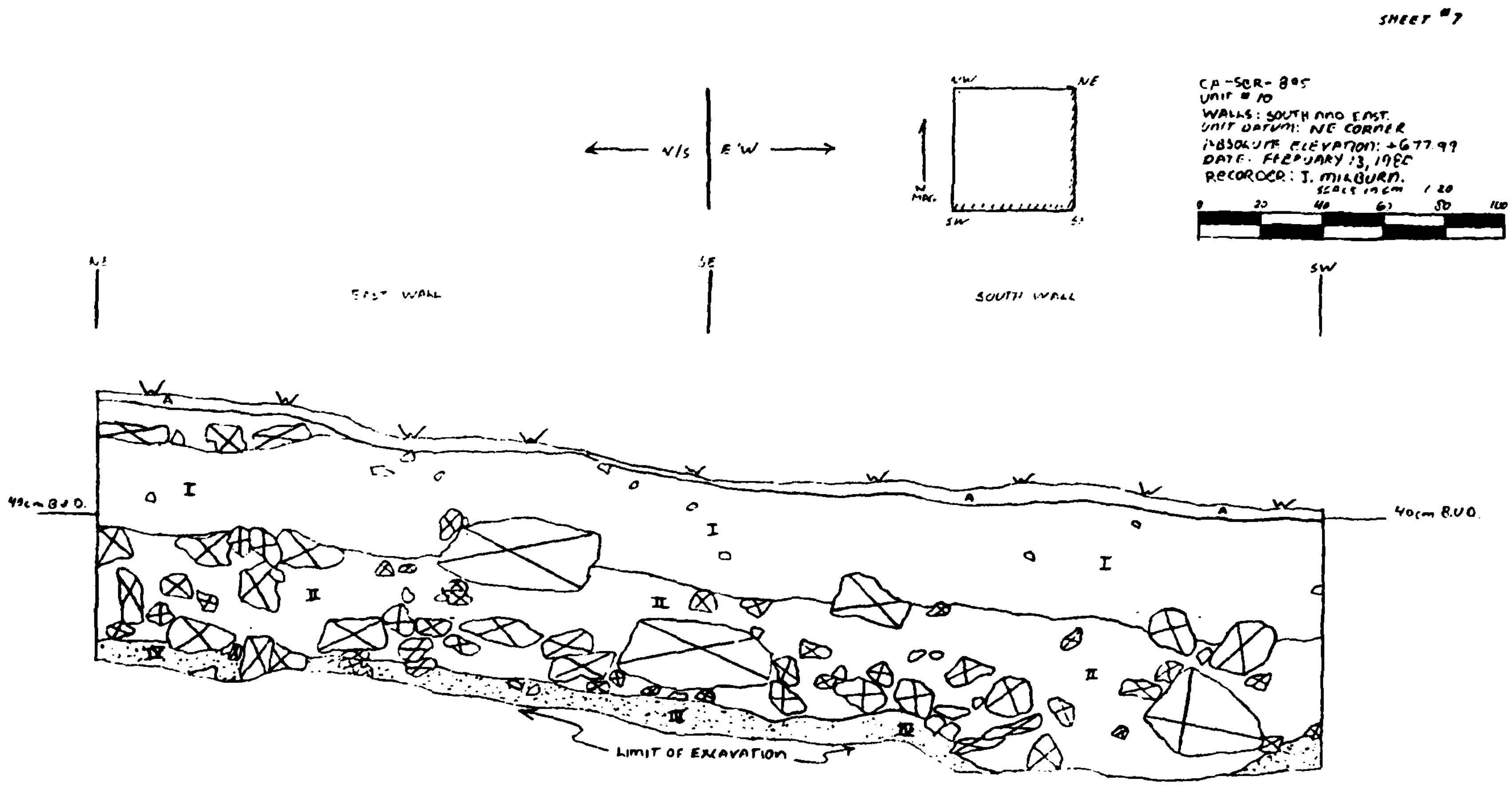

FIGURE 9: Excavation Unit #10 - East/South Wall Profiles

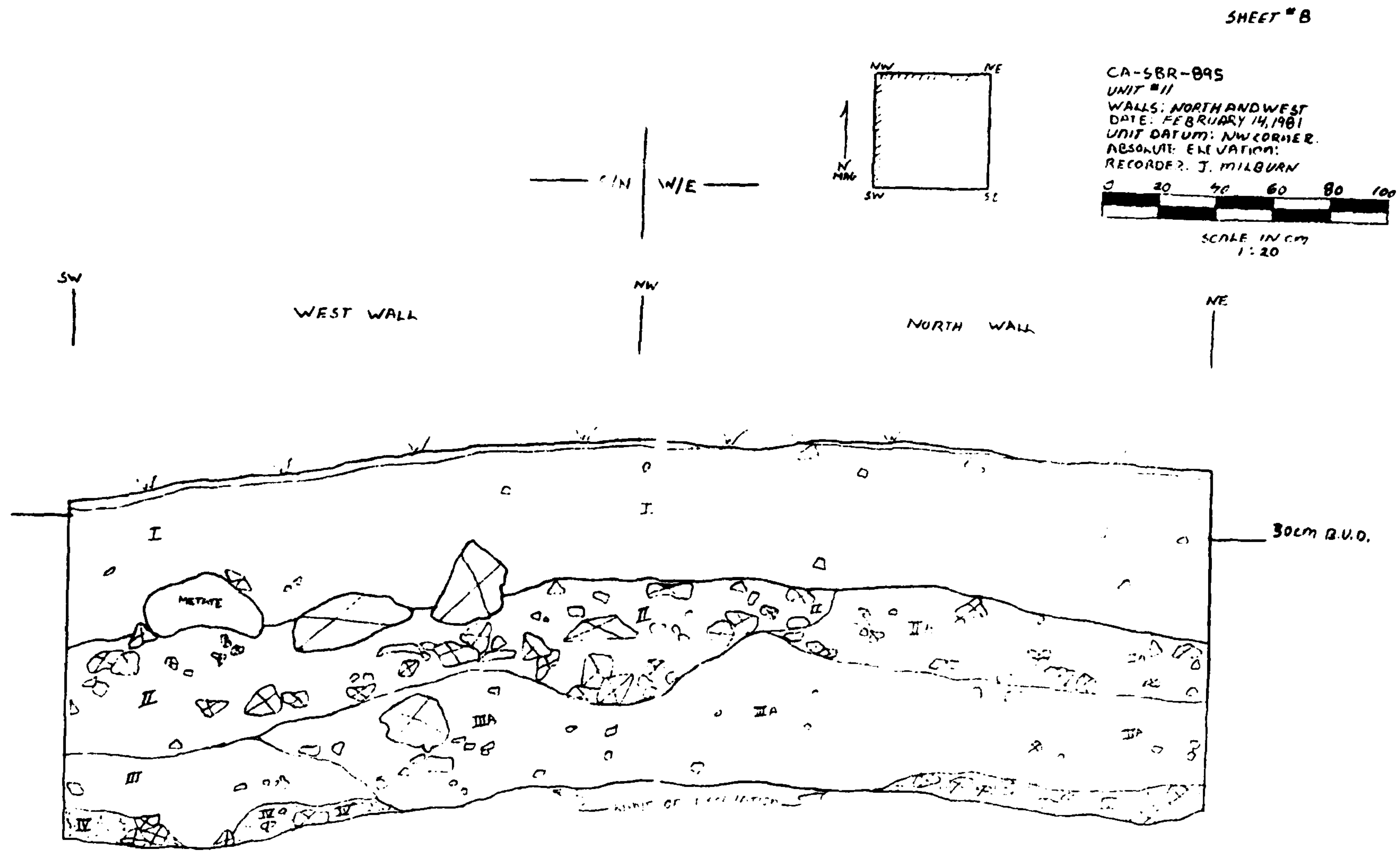

FIGURE 10: Excavation Unit #11 - North/West Wall Profiles

sand. Clastics =15% of layer, predominately small subangular pebbles, 70%, 15% granules (angular), 15% medium/large pebbles. Fairly compact, homogeneous deposit. High water holding capacity (i.e. high permeability), numerous port spaces, massive structural grade, very limited ped formation, small to medium subrounded blocky structure. Corresponds to A_1 horizon. Probable origin is slope-wash colluvium modified by plant growth. Very little cultural material, probably post-occupation accumulation. Moderately sorted. High kurtosis (i.e., very peaked grain-size curve).

Boundary: gradational, very irregular

Munsell Color: (10 YR 3/2) very dark greyish brown

Additional Comments: penetrated by fine rootlets, relatively high organic matter content compared to lower layers.

Unit #7: Layer thickens to the SE.

Unit #6: Layer increases in thickness to the south. Contains slightly more angular clastics than in Unit #7, very disturbed by two pipes.

Unit #5: Very thin compared to outcrop in adjacent units. Probably disturbed by road construction and erosion. Probably partially deflated.

Unit #8: Very thin. Extensively disturbed. Due to proximity of the creek, this area has probably been extensively eroded.

Label II: All Units

Loamy sand, very friable to loose consistency, non-plastic. Clastics are present in large quantities =40-50%; boulders represent 20% of clastics, mainly angular to subangular; cobbles represent 30% from subrounded to angular; 40% pebble, subrounded to very angular; 10% subrounded granules. Rock types are primarily schist or gneiss, with occasional contact metamorphics and intrusive plutonics. Non-clastic matrix predominates, fine

sand with small silt (5%?), sand =50% very fine/fine sand, 30% medium sand, 20% coarse sand. Low water holding capacity, very high pore space, massive structure grade, no ped formation, granular to structureless. Structure slightly modified by soil formation, primarily introduction of organic matter, penetrated by fine rootlets. Very poorly sorted. Low kurtosis (flat).
Boundary: gradational, irregular
Munsell Color: (10 YR 4/2) dark greyish brown
Additional Comments: There is so much cultural material in this layer that it must represent an occupation layer.
Unit #7: Not very high boulder content compared to other unit outcrops.
Unit #6: Most typical expression of this layer.
Unit #5: Higher boulder/pebble percent than units #6 or #7.
Unit #8: Extremely high boulder content 50%, pebbles/cobbles 50%, clastics represent about 60% of the entire layer.

Label III: Units 5, 6, 7, 9 & 11

Loamy sand, very friable to loose consistency, even looser than Layer #2, primarily distinguished by decrease in clastics and pebbles relative to Layer 11. Non-clastics make up 70% of the layer: 5% silt, very fine/fine sand 50% medium sand 35%, coarse/very coarse sand 10%. Clastics (30% of layer): no boulders, 10% cobbles, 25% granules, 65% pebbles, predominately small to very small. Rootlets absent. Rock types are essentially identical to Layer 11. Massive grade, structureless, very low moisture holding capacity. Non-plastic, moderate to poorly sorted.
Boundary: gradational, irregular
Munsell Color: (10 YR 4/2) dark greyish brown
Additional Comments: This is probably the main locus of occupation. In Unit #5 there was an increase in Munsell value compared to the surrounding units. May be more organics for this layer.

Unit #7: This layer in Unit 7 is equivalent to Layers 111 and IV in adjacent units.
Unit #6: This is the purest expression of this layer.
Unit #8: #11. Absent, possibly combined with 11.

Label IV: Units 5, 6, and 9

Sandy/loamy sand, very friable and loose consistence. Essentially identical to Layer 111 in the description of the non-clastic sediment except for an increase in the percent of coarse and medium sand (m=45%, c=15%). The percent of clastics has increased dramatically however from 30% to 50% of the layer. Boulders are also present and make up to 30% of the clastics. This layer was distinguished from Layer 111 as a zone of larger rocks between Layer 111 and the basal conglomerate. It really represents only an accumulation of large rocks directly on top of the basal conglomerate. It must be considered part of the occupation layer with metates appearing in this layer lying on top of the basal conglomerole in Unit 11. Very poorly sorted, no rootlets. Probably represents boulders and pebbles derived from the layer below which stayed in place when material around it eroded away, accompanied by soil development upon the basal conglomerate.
Boundary: Abrupt/high contrast with basal conglomerate, diffuse, very low contract with Layer 111.
Munsell Color: (10 YR 4/2) dark greyish brown.

Label IV in Units 7, 8, 10 and 11
Label V in Unit 9
Label VI in Unit 5
Label VII in Unit 6

Basal Conglomerate: sand, pebble conglomerate. Clastics make up 75% of the layer: 5% cobbles, 60% subangular to subrounded pebbles, 10% angular (predominates) to rounded granules. Rock types are primarily schists or gneiss with occasional contact metamorphics. Sand makes up 25% of the layer, and is primarily 60% coarse to very coarse, 30% medium sand, 10% fine sand. Moderately sorted, structureless. Orientation is not consistent, some tendency to dip SE or NW and align on NW/SE axis, probably indicating they are derived from the adjacent stream channel. This layer's upper boundary is extremely irregular due to truly extensive rodent disturbance. All grams are stained yellow from oxidation. Limonite formation $Fe_2 0_3$ - N H_2O. Subareal surface at some point.

Boundary: Unknown

Munsell Color: between 25 Y and 10 YR 7/6 yellow.

Additional Comments: Some rock types which appear in this layer do not show up in sediments above this layer (noted by Digua).

Unit #7: Some indication of armoring.

Unit #6: This layer underlies a very similar depositional layer (Vl) which respresents a remobilization of Layer Vll with addition of finer particles or simply a sorting of Layer Vll during redeposition.

Unit #5: Occasional cobbles and boulders appear in this unit.

Unit #8: Boulders are exposed in this layer.

Creek/Road Profile It is evident that the layer is extremely thick (2 m+) and internally stratified with alternating bands (beds) of pebbles, sand, and cobbles. It is armored at the top and underlies the entire site. Definitely fluvial origin.

For the purposes of intra-assemblage comparison (Section 7.0), each 10 cm excavation level was assigned to the stratum category to which it most closely corresponded (Table 12). The artifacts were grouped into those found in Stratum 1 levels, those found in Stratum 11 levels, and those found in all levels below Stratum 11 ("111-"). Further distinctions among the strata below Stratum 11 were not used since these were generally less continuous and thinner and had little correspondence to our 10 cm excavation levels. The relation of artifact and debitage densities to the strata are discussed in Section 7.0.

TABLE 12: Levels Assigned to Each Stratum In Centimeters

Excavation Unit	5	6	7	8	9	10	11
STRATUM I	0-30	0-60	0-40	0-30	0-50	0-40	0-50
STRATUM II	30-60	60-90	40-90	30-70	50-90	40-90	50-80
STRATUM III-	60-100	90-130	90-120	-	90-120	-	80-120

Any of several processes might be responsible for the formation of Stratum 1. As was mentioned in Section 1.4, the west side of the hill has been scraped flat, evidently in conjunction with the laying of the pipes that cross this area (Map 3). Some portion of Stratum 1 in the central area of the site may be the result of this artifical displacement of the soil. But Stratum 1 was also found capping Units #8 and #10 nearer the stream bank to the west and southwest of the central area, and well beyond the limits of the area that would be expected to have been affected by the scraping. Stratum 1 appears to be more a product of an increased rate of colluviation possibly triggered by changes in the vegetative cover induced by historic-era grazing. Another factor that cannot be ruled out is the possibility that the increased colluviation might be the product of historic-era techtonic activity along the Cucamonga Fault, lifting the northern foothill side and increasing the gradient of the hillside north of the site.

In any event, it is clear that the deposition of Stratum 1 occurred during the historic-era, long after re-occupation of the site had ceased. The radiocarbon date obtained for scattered charcoal fro basal Stratum 1 levels in Units #7 and #9 was less than 180 B.P., essentially the modern limit of the method (Section 5.1).

The tendency for peak densities of the natural rock to occur at the top of Stratum 11 lead to Milburn's suggestion that the surface of the cultural deposit may have been deflated by erosion prior to its burial by Stratum 1.

END

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